Determinación de especies de fauna a partir de fragmentos

Laboratorio de Genética de la Conservación

Mailyn Gonzalez PhD
magonzalez@humboldt.org.co

Código de barras ADN

El País 60 años 1950 - 2010

NO MÁS VIOLENCIA ¡BASTA YA!

Google

Jueves 14 de Noviembre de 2013

Mundo

Las aves, una amenaza para la aviación

El año pasado, según la Aeronáutica, en Colombia hubo 18 incidentes por esta causa. Barranquilla la más amenazada.

Increíble, pero así es. Un pájaro o gallinazo de tan sólo 3 libras de peso, es capaz de derribar un enorme avión, que según cálculos imprecisos marca 700.000 libras de peso.

Los expertos lo reconocen y lo dicen sin pena, pero sí con mucho miedo y respeto: las aves son un peligro latente y una amenaza constante para la seguridad aérea en cualquier aeropuerto del mundo.

Accidente. Este fue el avión de US Airways qu aterrizó en el río Hudson, tras una emergenc en las turbinas, a causa de la presencia de gansos. Se salvaron 155 personas.
AP / El País

EL TIEMPO.COM

Jueves 14 de noviembre de 2013

Aves provocan alarma aérea en Barranquilla

Por: REDACCIÓN BARRANQUILLA | 10:43 p.m. | 06 de junio del 2013

Pájaro chocó contra turbina de un avión comercial. Se estudia la posibilidad de reubicar frutales.

SPECIAL FEATURES

Planes, birds, microscopes, and DNA

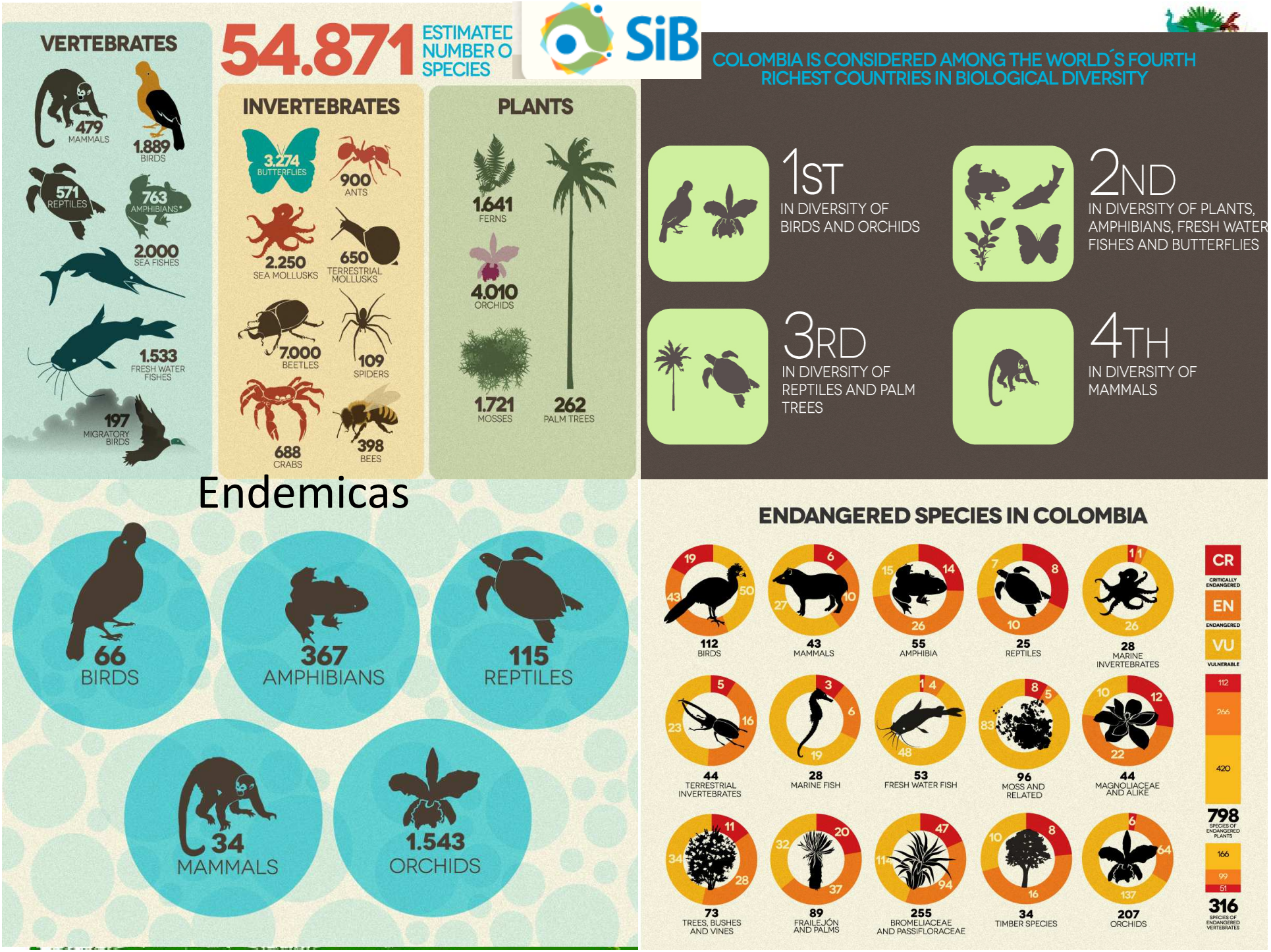
Smithsonian scientists do more than investigate bird-aircraft collisions - they push the limits of bird identification

By Jennifer Lynch | Published: 2/20/2009

It's sad but true.

Birds and planes have been colliding since the dawn of powered aviation. In fact, Orville Wright hit a bird, probably a Red-winged Blackbird, over an Ohio cornfield as early as 1905, not even two years after he and his brother Wilbur made their historic first flights.

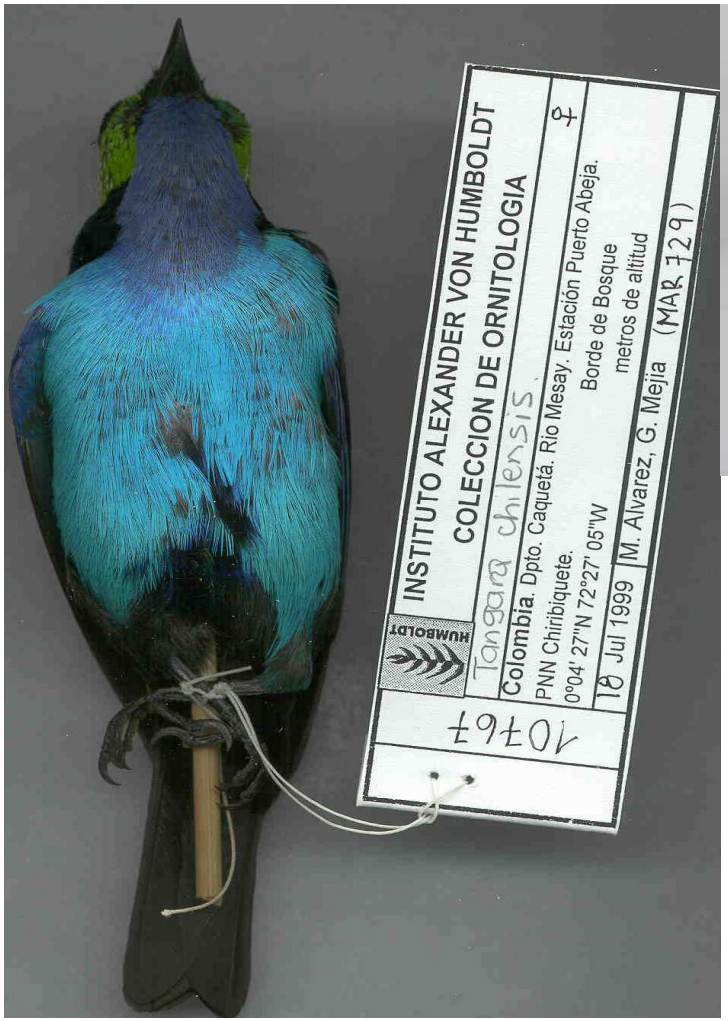
Because most early collisions resulted in the loss of a bird's life, not in damage to aircraft or human


VERTEBRATES
479 MAMMALS
1.889 BIRDS
571 REPTILES
763 AMPHIBIANS*
2.000 SEA FISHES
1.533 FRESH WATER FISHES
197 MIGRATORY BIRDS
54.871 ESTIMATED NUMBER O SPECIES
SiB
INVERTEBRATES
3.274 BUTTERFLIES
900 ANTS
2.250 SEA MOLLUSKS
650 TERRESTRIAL MOLLUSKS
7.000 BEETLES
109 SPIDERS
688 CRABS
398 BEES
PLANTS
1.641 FERNS
4.010 ORCHIDS
1.721 MOSSES
262 PALM TREES
COLOMBIA IS CONSIDERED AMONG THE WORLD´S FOURTH RICHEST COUNTRIES IN BIOLOGICAL DIVERSITY
1ST IN DIVERSITY OF BIRDS AND ORCHIDS
2ND IN DIVERSITY OF PLANTS, AMPHIBIANS, FRESH WATER FISHES AND BUTTERFLIES
3RD IN DIVERSITY OF REPTILES AND PALM TREES
4TH IN DIVERSITY OF MAMMALS
Endemicas
66 BIRDS
367 AMPHIBIANS
115 REPTILES
34 MAMMALS
1.543 ORCHIDS
ENDANGERED SPECIES IN COLOMBIA
112 BIRDS
43 MAMMALS
55 AMPHIBIA
25 REPTILES
28 MARINE INVERTEBRATES
44 TERRESTRIAL INVERTEBRATES
28 MARINE FISH
53 FRESH WATER FISH
96 MOSS AND RELATED
44 MAGNOLIACEAE AND ALIKE
73 TREES, BUSHES AND VINES
89 FRAILEJÓN AND PALMS
255 BROMELIACEAE AND PASSIFLORACEAE
34 TIMBER SPECIES
207 ORCHIDS
CR CRITICALLY ENDANGERED
EN ENDANGERED
VU VULNERABLE
112
266
420
798 SPECIES OF ENDANGERED PLANTS
166
99
51
316 SPECIES OF ENDANGERED VERTEBRATES

CARACTERIZACIÓN

Identificación

Colecciones biológicas



Forensic feather expert and lab founder Roxie Laybourne in one of the many rows of collections in the Smithsonian's Bird Division. Image by Chip Clark, SI Photo Services

Identificación a partir de fragmentos

Birdstrike damage and remains

Figure 1. Damage to the AN/AAQ-17 Infrared Detecting Set on an MC-130H aircraft resulting from a strike with a Lesser dawn bat (*Eonycteris spelaea)* in Thailand. (*Photo courtesy Major T. R. Murphy, Chief of Flight Safety, 353rd Special Operations Unit, U.S. Air Force*)

Human–Wildlife Conflicts 3(2):179–185, Fall 2009

Forensic bird-strike identification techniques used in an accident investigation at Wiley Post Airport, Oklahoma, 2008

Carla J. Dove, Smithsonian Institution, Feather Ide
History, E-600, MRC 116, P.O. Box 37012, Washington,
Nor Faridah Dahlan, Smithsonian Institution, Fea
Natural History, E-601, MRC 116, P.O. Box 37012, Was
Marcy Heacker, Smithsonian Institution, Feather Ide
History, E-601, MRC 116, P.O. Box 37012, Washington,

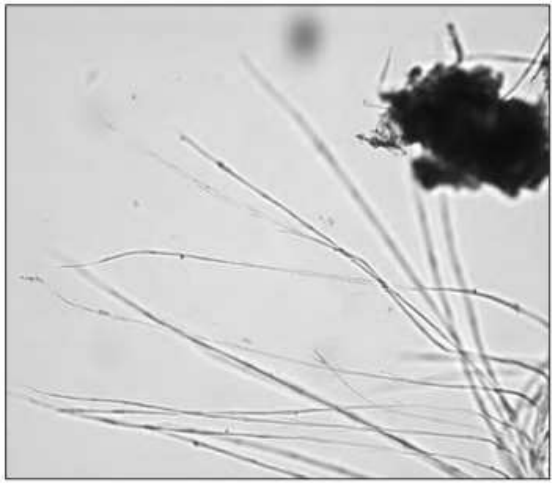


Figure 3. Photomicrograph of a downy feather sample collected from the tail section of the Cessna Citation that crashed near Wiley Post Airport, Oklahoma. The diagnostic microscopic characters of the downy barbs in this sample include short barbules with long, distal prongs.

DNA analysis of Bird strike

The Australian Museum's DNA identification service for wildlife strikes.

Birdstrike sample
Andrew King © Australian Museum

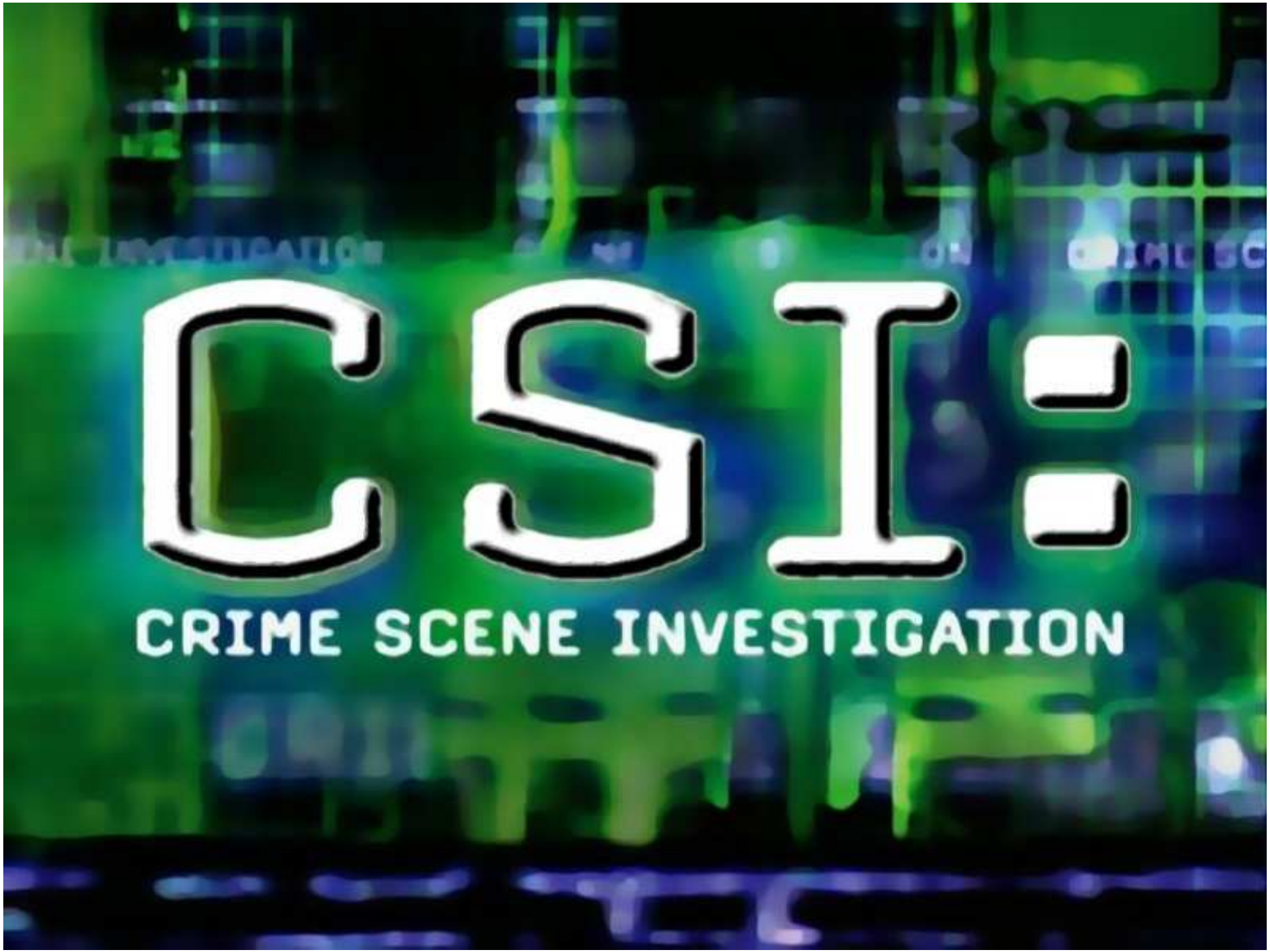
INTERNATIONAL BIRD STRIKE COMMITTEE
IBSC 24/WP 9

Stara Lesna, Slovakia, 14 -18 September 1998

IDENTIFICATION OF BIRDSTRIKE REMAINS BY DNA ANALYSIS

J.R. Allan* C. Conyers" A. A1acNicholl" A. Baxter*

Central Science Laboratory
*Birdstrike Avoidance Team
#Biochemistry & Molecular Genetics Team
Sand Hutton
York, Y041 1LZ
UK


CSI:
CRIME SCENE INVESTIGATION

Contexto histórico

*cox*1 → código de barras en animales

Dr. Paul Hebert

THE ROYAL SOCIETY

Received 29 July 2002
Accepted 30 September 2002
Published online 8 January 2003

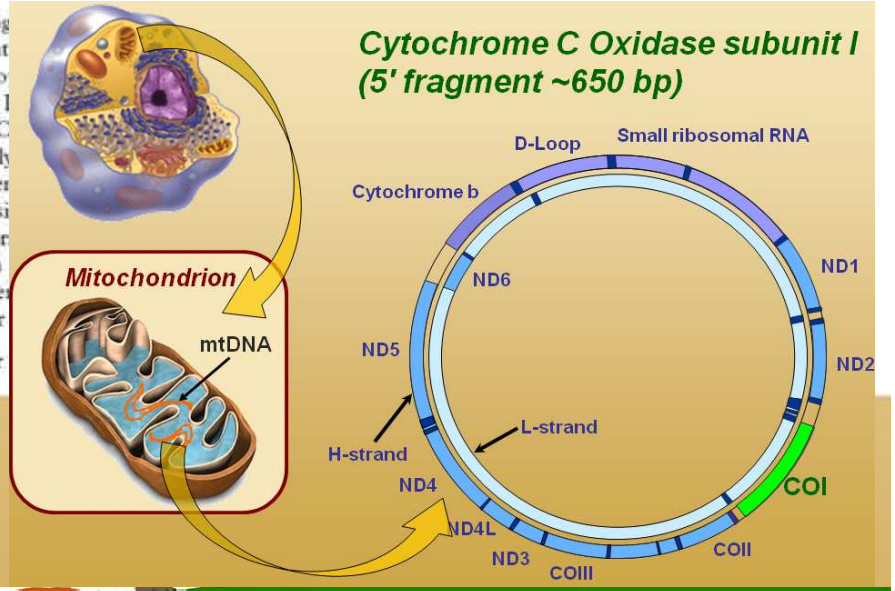
Biological identifications through DNA barcodes

Paul D. N. Hebert*, Alina Cywinska, Shelley L. Ball and Jeremy R. deWaard

Department of Zoology, University of Guelph, Guelph, Ontario N1G 2W1, Canada

Although much biolog
We are convinced that
of systems that emplo
cytochrome *c* oxidase I
we demonstrate that C
ordinarily assign newly
species-level assignmer
based upon the analysi
100% successful in cor
system will provide a
identification. Its asse
the rules of molecular

Keywords: molecular

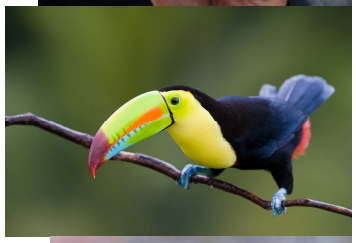


Código de barras ADN

"Identificador Universal"

Utilización de una región génica Estándar

A G C C T



A G C G G

T T A T A

Universal:

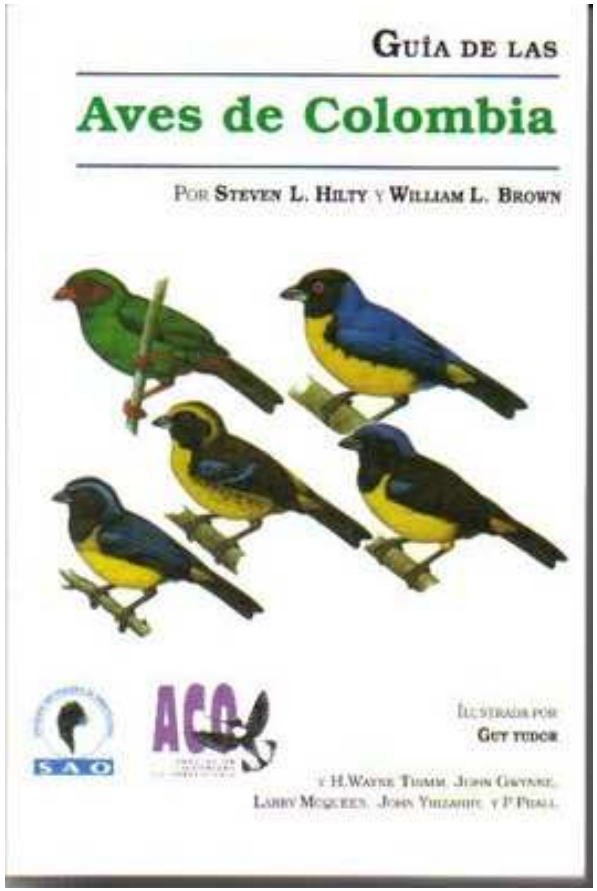
Presente en todos los organismos

Variable:

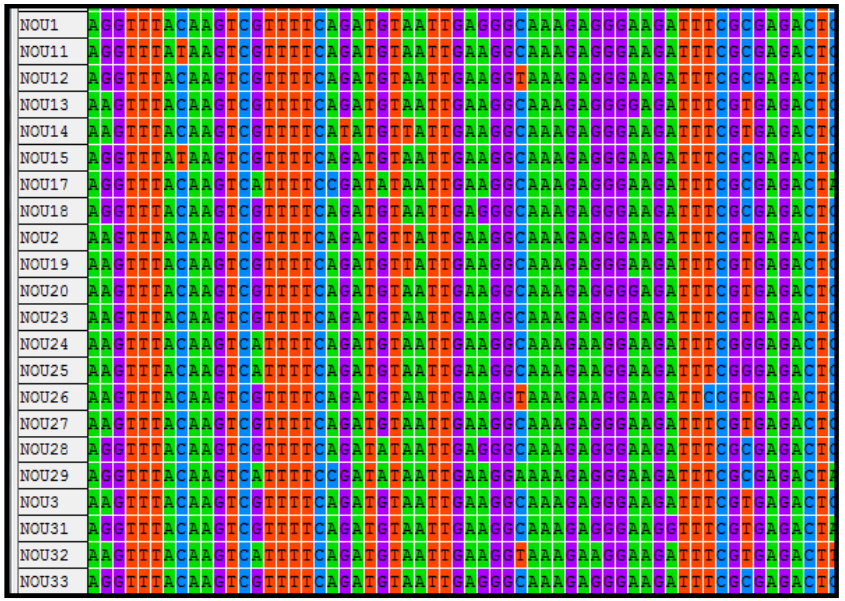
Único para cada especie

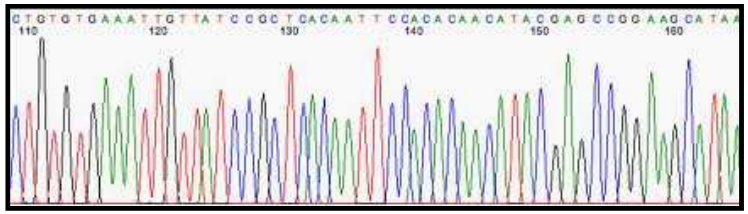
Generación de una base de referencia global de ADN

Catálogo morfológico de especies



Catálogo molecular de especies

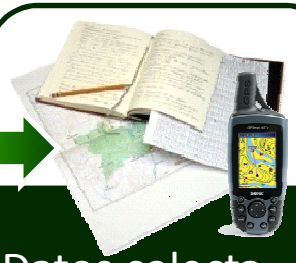




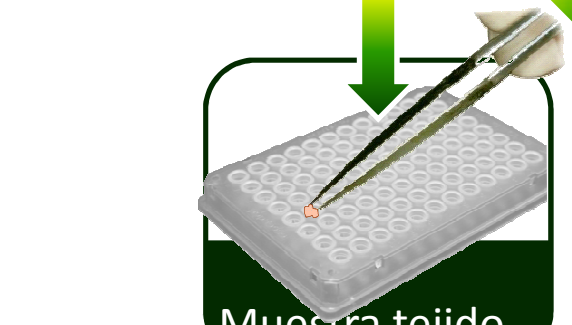
Democratizar la taxonomía
Estandarizar la identificación
Identificar las especies sin caracteres diagnósticos

Base de referencia códigos de barras de ADN

Especimen

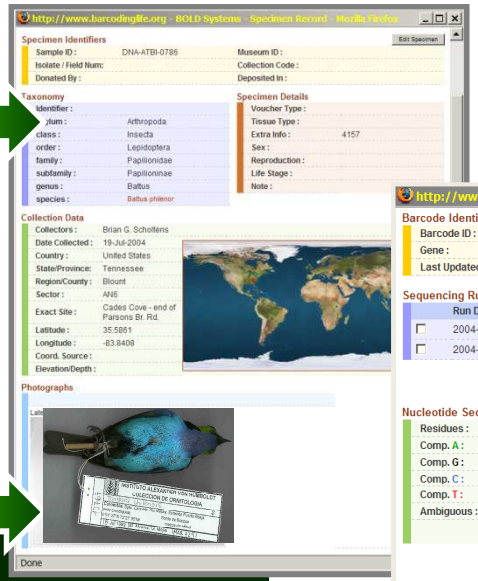


Datos colecta



Muestra tejido

Fotografía



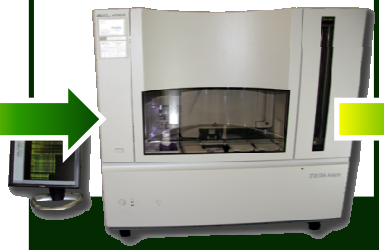
BOLDSYSTEMS

Online Repository

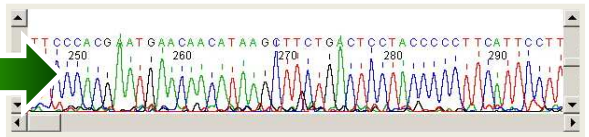
Datos especimen

Extracción ADN

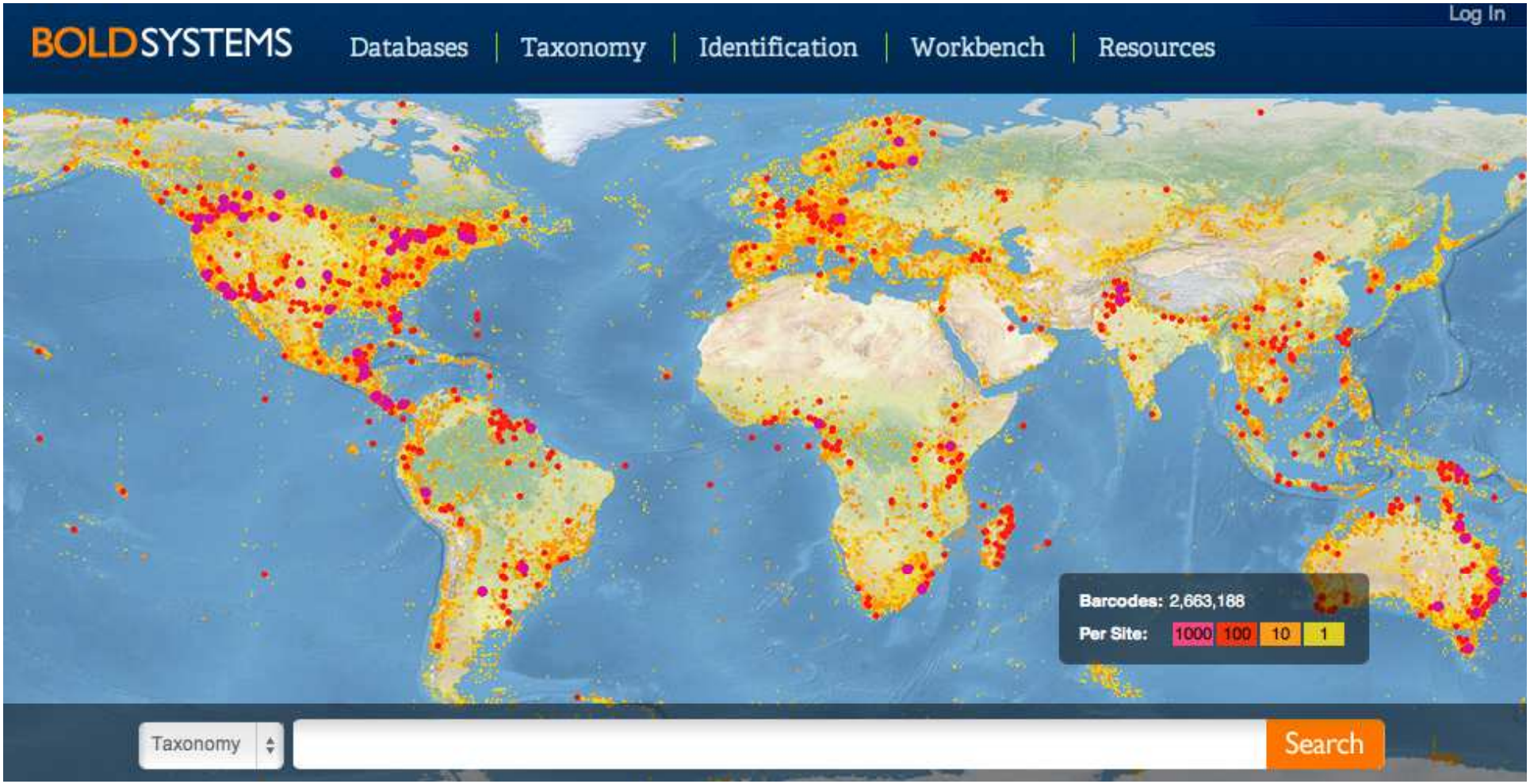
Amplificación PCR

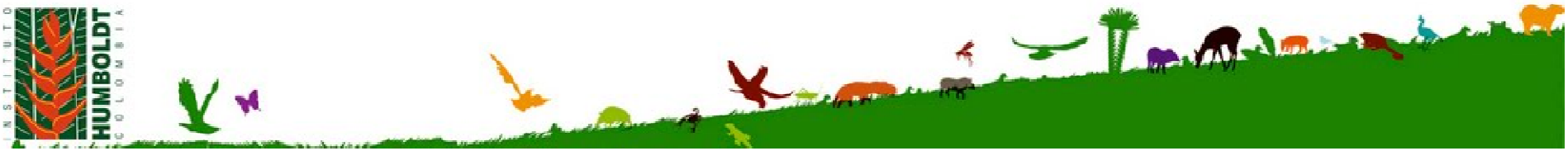


Secuenciación



Códigos de barras de ADN (secuencias + cromatogramas)


Log In
BOLDSYSTEMS
Databases
Taxonomy
Identification
Workbench
Resources
Barcodes: 2,663,188
Per Site:
1000
100
10
1
Taxonomy
Search

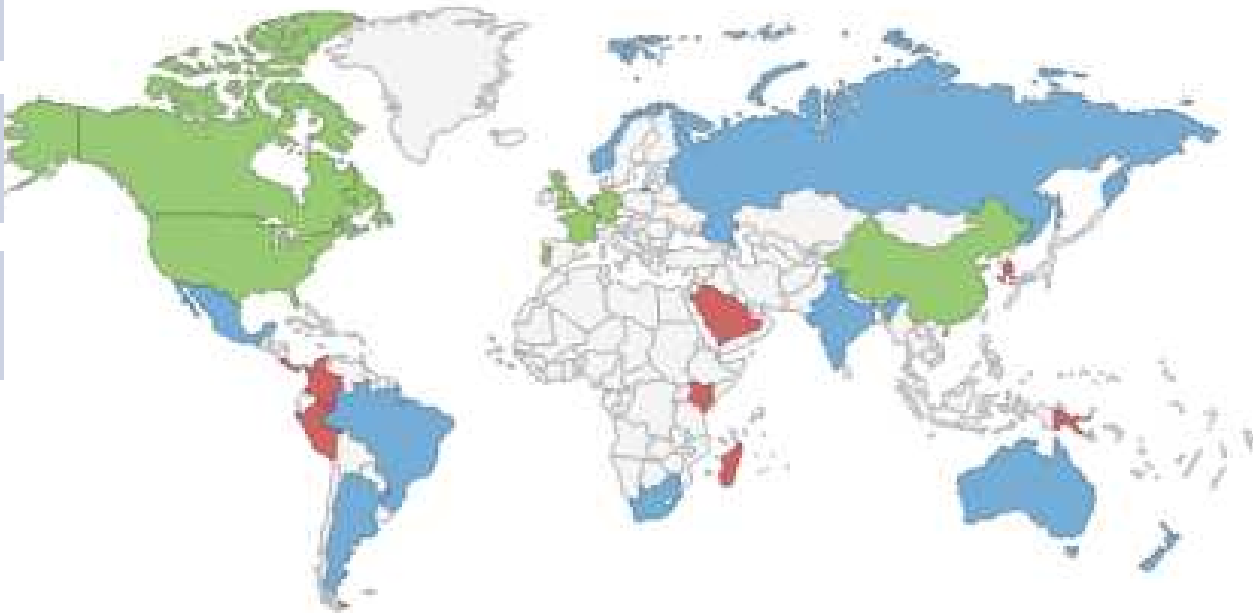

INSTITUTO
HUMBOLDT
COLOMBIA

iBOL
International Barcode of Life

5 Years

5M especímenes

500K especies



Progreso y aplicaciones

Divergencia del 2% para diferenciar entre las especies

El gen cox1 ha permitido una identificación correcta de >95% de las especies de aves estudiadas

(*Hebert et al.2003, 2004*)

Ecobreves – ARGENTINA: Swift Progress in DNA Barcoding of Birds

Molecular Ecology Notes

Wiley-Blackwell, John Wiley & Sons

Comprehensive DNA barcode coverage of North American birds

KEVIN C R KERR, MARK Y STOECKLE, [...], and PAUL D N HEBERT

ZooKeys

Project Description: DNA Barcodes of Bird Species in the National Museum of Natural History, Smithsonian Institution, USA

David E. Schindel, Mark Y. Stoeckle, [...], and Gary Graves

MOLECULAR ECOLOGY
RESOURCES
Molecular Ecology Resources (2011)
doi: 10.1111/j.1755-0998.2011.03089.x

Application of multiplex PCR approaches for shark molecular identification: feasibility and applications for fisheries management and conservation in the Eastern Tropical Pacific

S. CABALLERO,* D. CARDEÑOSA,* G. SOLER† and J. HYDE‡
*Laboratorio de Ecología Molecular de Vertebrados Acuáticos-LEMVA, Departamento de Ciencias Biológicas, Universidad de los Andes, Carrera 1 No. 18A-10, Bogotá, Colombia, †Fundación Malpelo y otros Ecosistemas Marinos, Carre
Bogotá, Colombia, ‡Southwest Fisheries Science Center, National Marine Fisheries Service, 8604 La Jolla S
92037 USA

OPEN ACCESS Freely available online
PLoS one

Barcoding Nemo: DNA-Based Identifications for the Ornamental Fish Trade

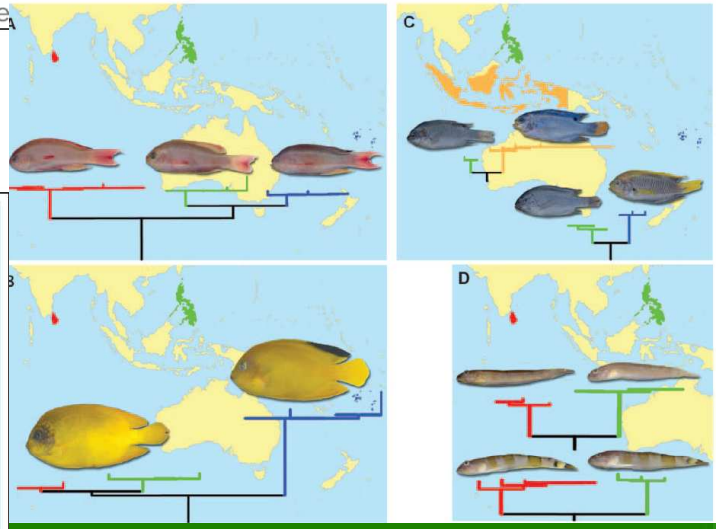
Dirk Steinke*, Tyler S. Zemlak, Paul D. N. Hebert
Canadian Centre for DNA Barcoding, Biodiversity Institute of Ontario, University of Guelph, Guelph, Ontario, Canada

Abstract

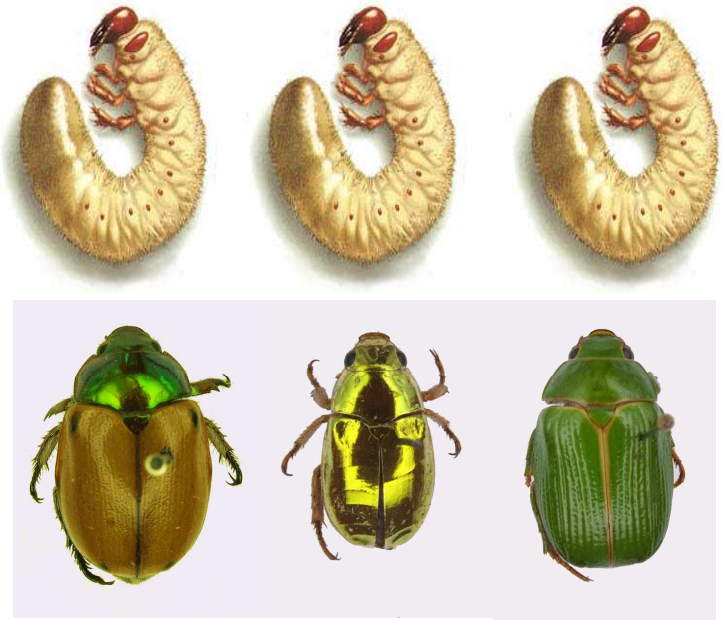
Background: Trade in ornamental fishes represents, by far, the largest route for the importation of exotic vertebrates. There is growing pressure to regulate this trade with the goal of ensuring that species are sustainably harvested and that their point of origin is accurately reported. One important element of such regulation involves easy access to specimen identifications, a task that is currently difficult for all but specialists because of the large number of species involved. The present study represents an important first step in making identifications more accessible by assembling a DNA barcode reference sequence library for nearly half of the ornamental fish species imported into North America.

Methodology/Principal Findings: Analysis of the cytochrome *c* oxidase subunit I (COI) gene from 391 species from 8 coral reef locations revealed that 98% of these species exhibit distinct barcode clusters, allowing their unambiguous identification. Most species showed little intra-specific variation (adjusted mean = 0.21%), but nine species included two or three lineages showing much more divergence (2.19–6.52%) and likely represent overlooked species complexes. By contrast, three genera contained a species pair or triad that lacked barcode divergence, cases that may reflect hybridization, young taxa or taxonomic over-splitting.

Conclusions/Significance: Although incomplete, this barcode library already provides a new species identification tool for the ornamental fish industry, opening a realm of applications linked to collection practices, regulatory control and conservation.



Medicina forense



Forensic botany: species identification of botanical trace evidence using a multigene barcoding approach

Gianmarco Ferri · Milena Alù · Beatrice Corradini · Giovanni Beduschi

Control de calidad de productos

Assessing the reliability of the marketed identity in meat food products for human consumption, their potential origins and related risks for health, food security and ecosystem preservation in the country”

CorpoGen
Investigación y Biotecnología

Howard Junca

Science News Share Blog Cite

DNA Analysis Suggests Whale Meat from Sushi Restaurants in L.A., Seoul Originated from Japan

ScienceDaily (Apr. 14, 2010) — An international team of Oregon State University scientists, documentary filmmakers and environmental advocates has uncovered an apparent illegal trade in whalemeat, linking whales killed in Japan's controversial scientific whaling program to sushi restaurants in Seoul, South Korea, and Los Angeles, Calif.

Man Caught Smuggling Live Hummingbirds In Underwear

03 Oct 2011 by **Steyn du Toit** in **Animals, Crime, Uncool, World**

Is that several hummingbirds in your pocket, or are you just happy to see me?

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Tráfico en los aeropuertos

Conserv Genet
DOI 10.1007/s10592-009-9967-0

RESEARCH ARTICLE

Barcoding bushmeat: molecular identification of Central African and South American harvested vertebrates

Mitchell J. Eaton · Greta L. Meyers ·
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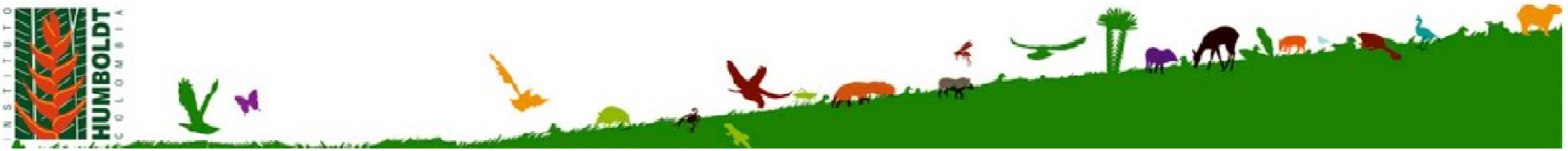

iBOL COLOMBIA
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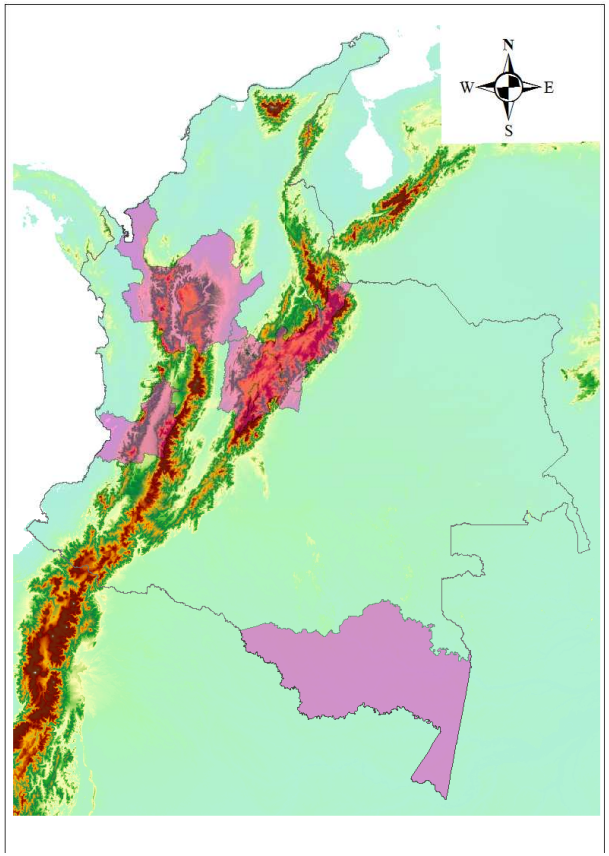
18 años



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Instituto amazónico de investigaciones científicas SINCHI

INVEMAR

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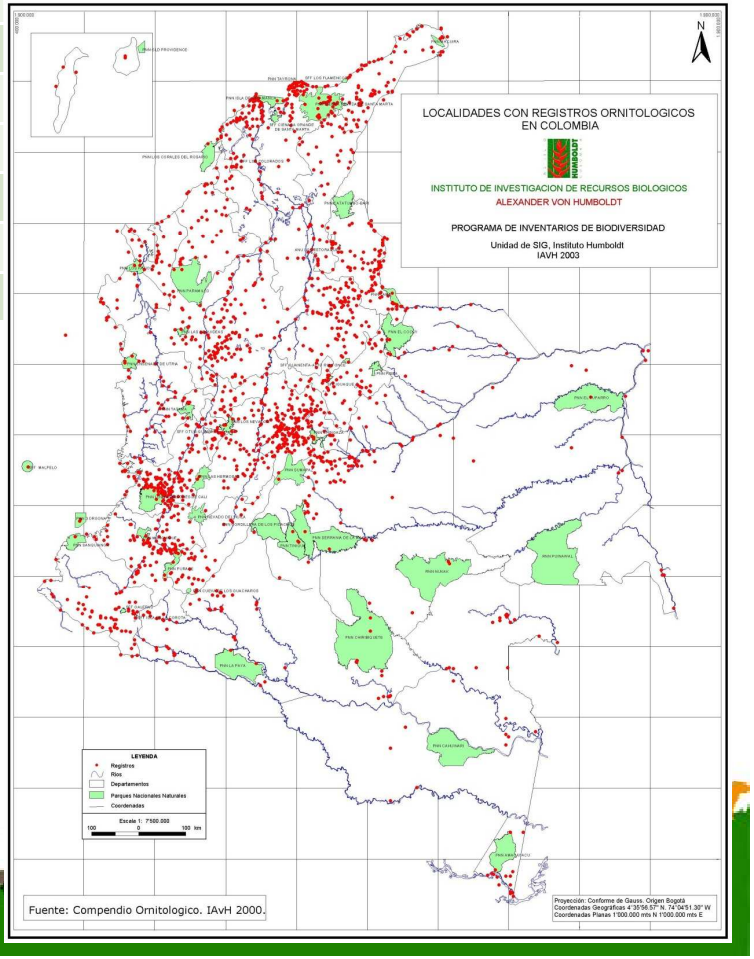
Pontificia Universidad JAVERIANA
Bogotá

CorpoGen
Investigación y Biotecnología

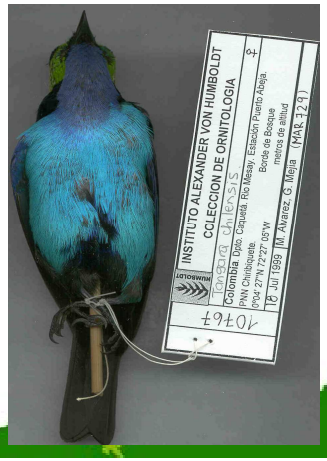
COLECCIONES BIOLOGICAS - IAVH

Colección	Ejemplares Catalogados	% Sistematización	Total No. Especies
Aves	15276	95	1412
Anfibios	9280	99	455
Reptiles	6001	80	481
Mamíferos	8626	90	465
Peces	11877	99	1385
Herbario	101056	96	10853
Entomológica	170000	10	-
Oológica	25600	0	2000?

75 % de las especies de aves de Colombia

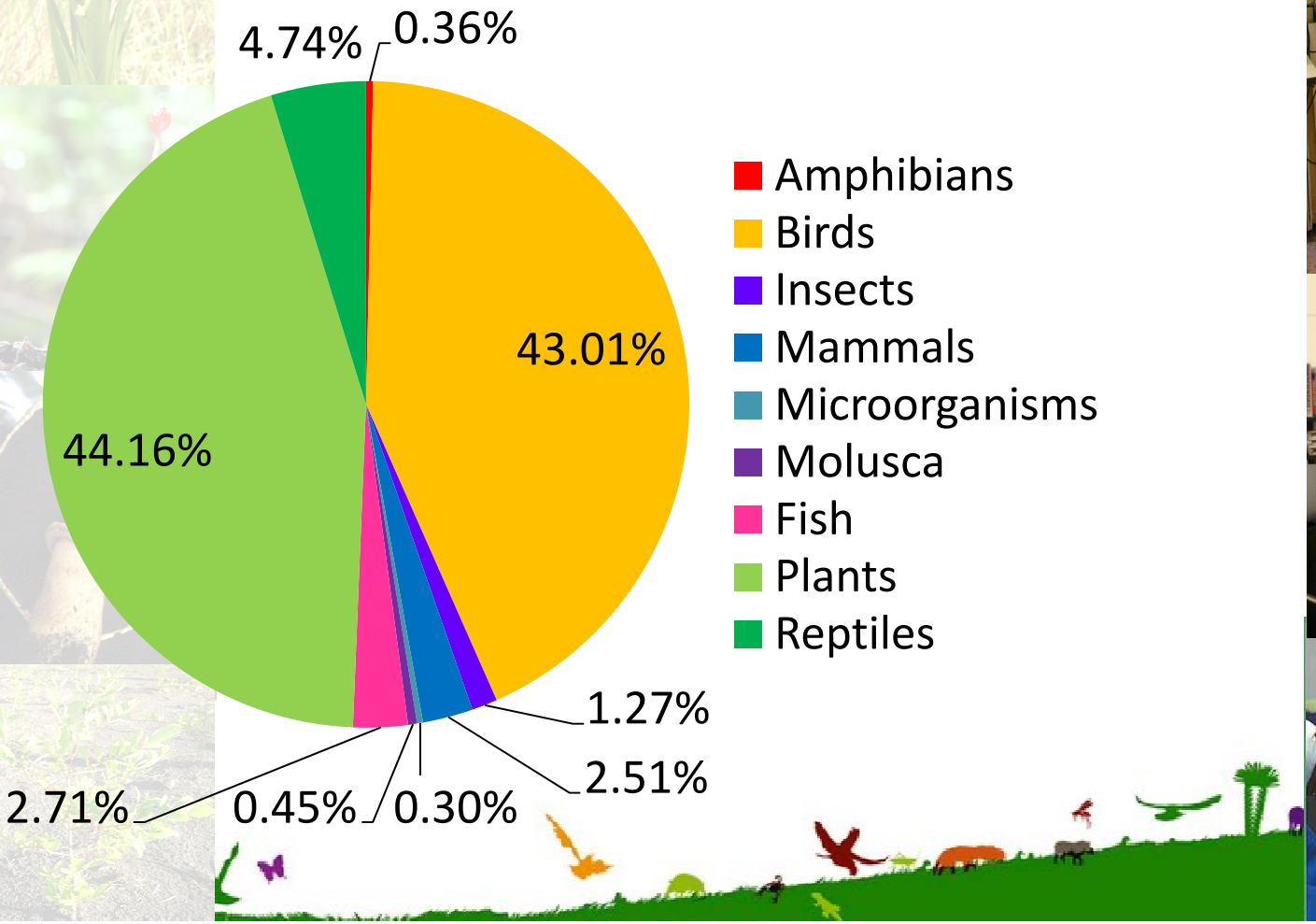


Representatividad geográfica de registros ornitológicos (2003)



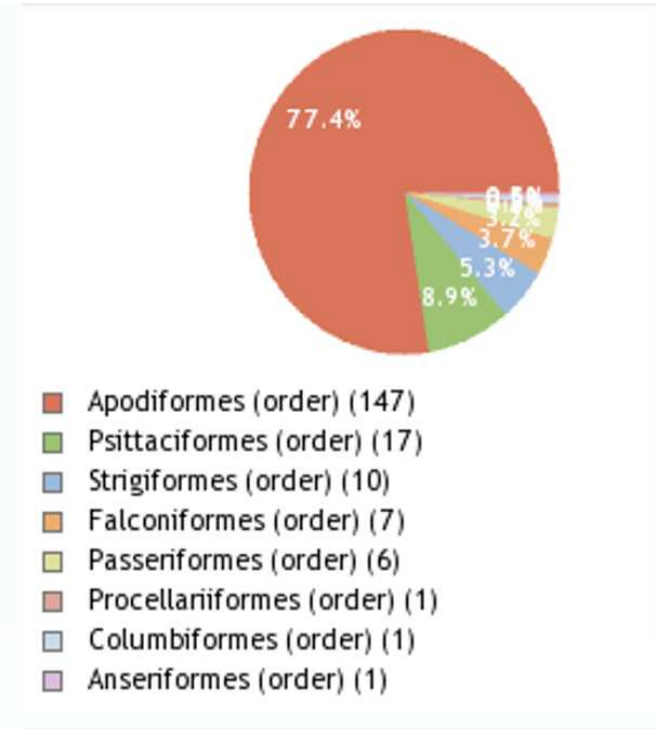
Colección de tejidos del IAvH

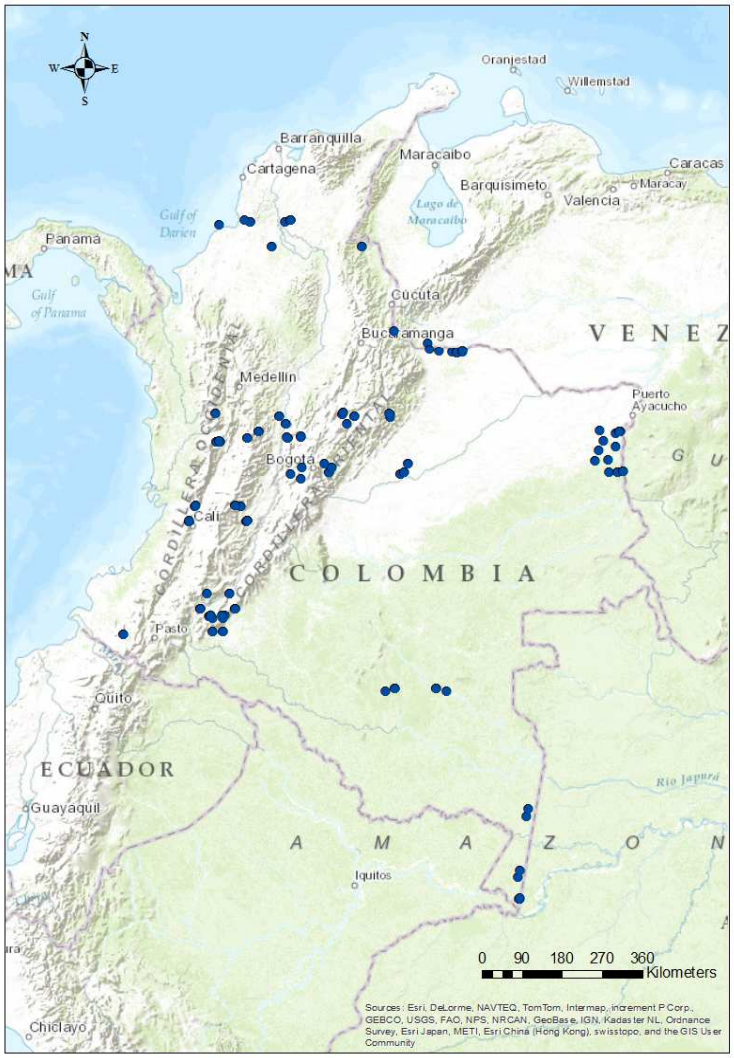
The tissue collection of the Alexander von Humboldt Institute preserves 15000 samples of Colombia biodiversity



Aves de la colección del Instituto Humboldt

Mailyn Gonzalez, Andrea Paz, Claudia Medina, Diana Lopez, Maria Fernanda Torres.





190 COI sequences

88 species

Urosticte ruficrissa|IAvH-BT 805|Apodiformes

Urosticte ruficrissa|IAvH-BT 2313|Apodiform

Haplophaedia aureliae|IAvH-BT 2446|Apodi

Haplophaedia aureliae|IAvH-BT 2440|Apodi

delomyia melanogenys|IAvH-BT 5339|Apodiformes|

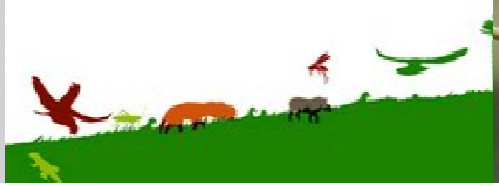
Coeligena coeligena|IAvH-BT 7340|Apoc

Coeligena coeligena|IAvH-BT 5334|A

Aglaiocercus coelestis|IAvH-BT 6854|Apodiformes|BOLD:ACH0019

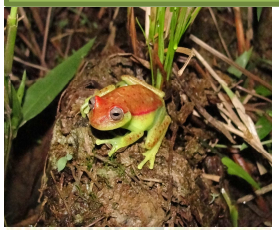
Aglaiocercus kingi|IAvH-BT 7358|Apodiformes|BOLD:ACI1598

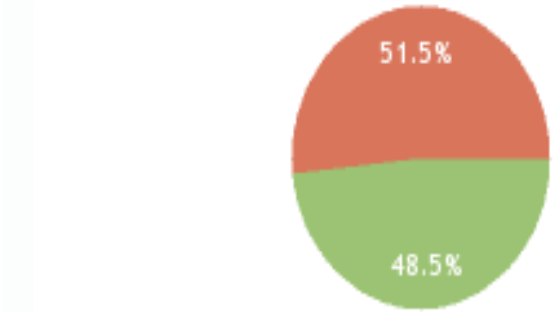
Aglaiocercus kingi|IAvH-BT 4070|Apodiformes|BOLD:ACH0018

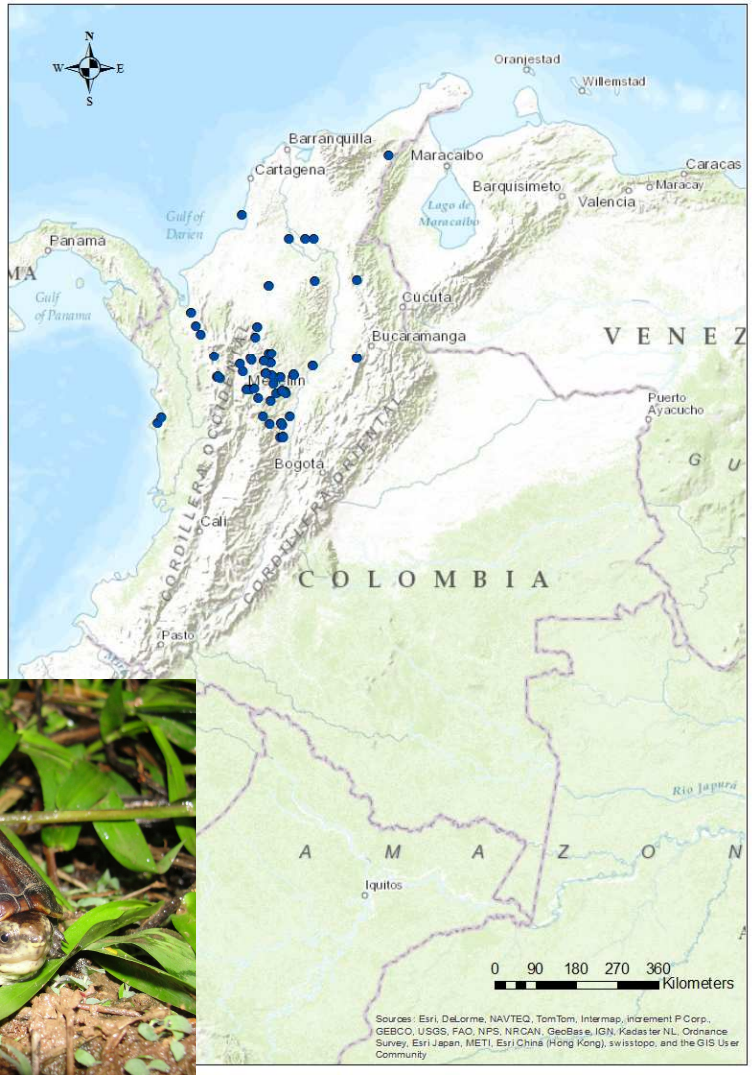


Código de barras de herpetos

Andrew Crawford, Lucas Barrientos, Juan Daza







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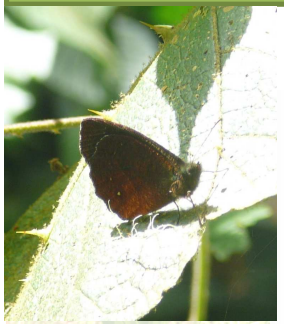
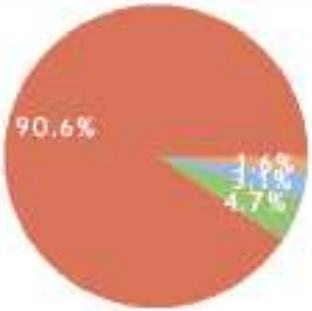
1803

Código de barras de mariposas



Sandra Uribe

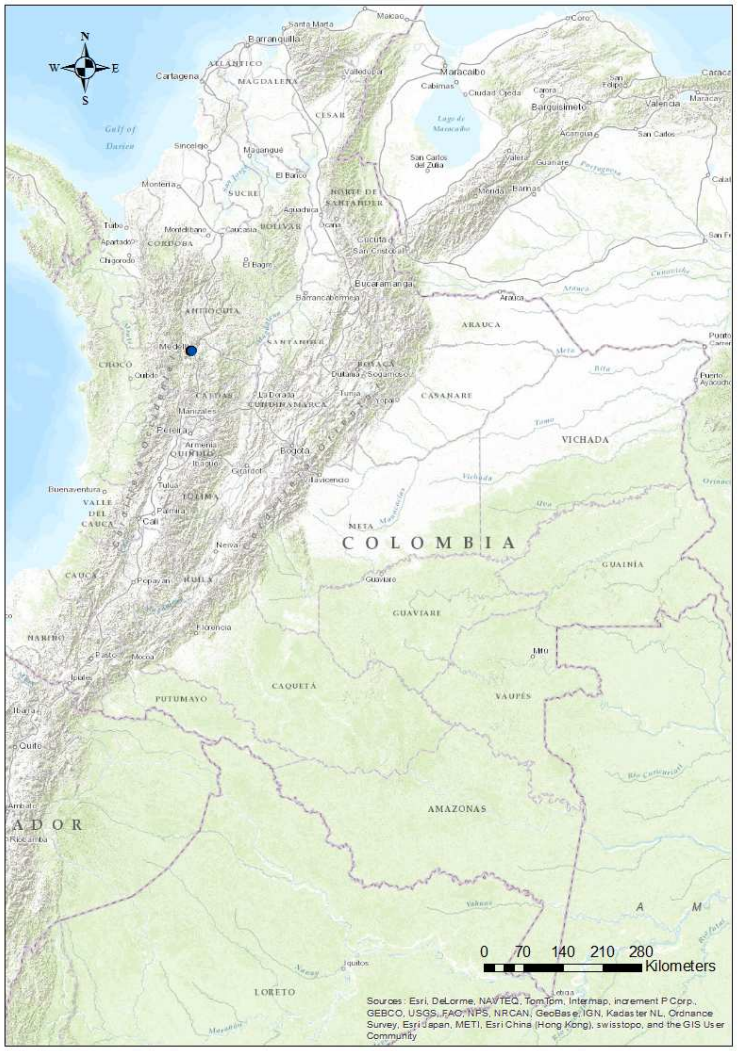


- Satyrinae (subfamily) (58)
- Morphinae (subfamily) (3)
- Eretris (genus) (2)
- Junea (genus) (1)

Pedaliodes_baccara

Daedalma dinias

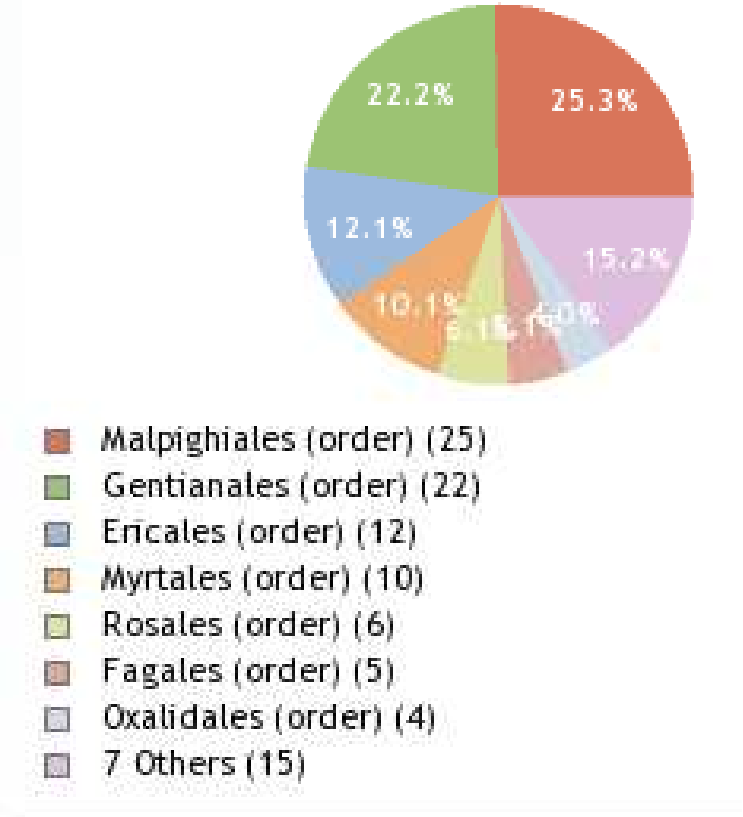
Lymanopoda labda



UNIVERSIDAD NACIONAL DE COLOMBIA
SEDE MEDELLÍN
FACULTAD DE CIENCIAS
GRUPO DE INVESTIGACIÓN EN SISTEMÁTICA MOLECULAR - GSM

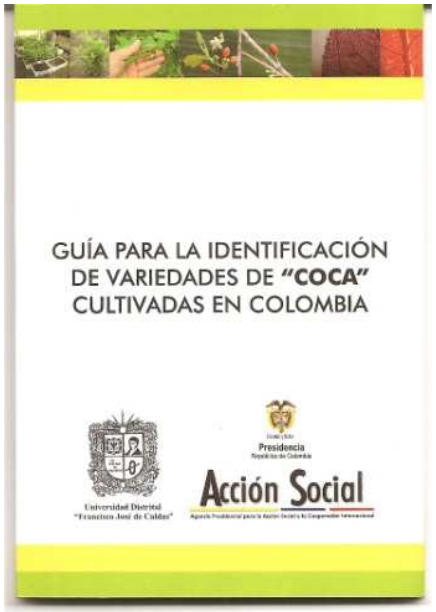
Código de barras del herbario forestal

Rocio Cortés-B **rpcortesb@udistrital.edu.co**



UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

The UDBC identifies Coca species and varieties for the Presidential Program against illegal Crops, and the United Nations Office on Drugs and Crime.

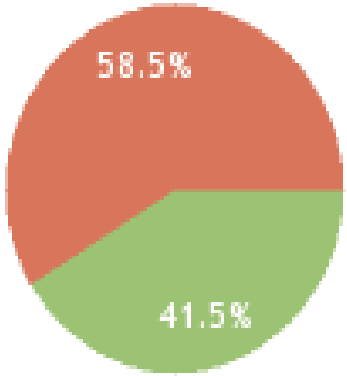


Colombia has extensive areas cultivated with two species and three varieties of *Erythroxylum*, used for the illicit extraction of cocaine:

- *E. coca* var. *coca*
- *E. coca* var. *ipadu*
- *E. novogranatense* var. *novogranatense*

Código de barras flora de La Lindosa

Lorena Quintero Barrera, Mabel Morales Velásquez
& Dairon Cárdenas López

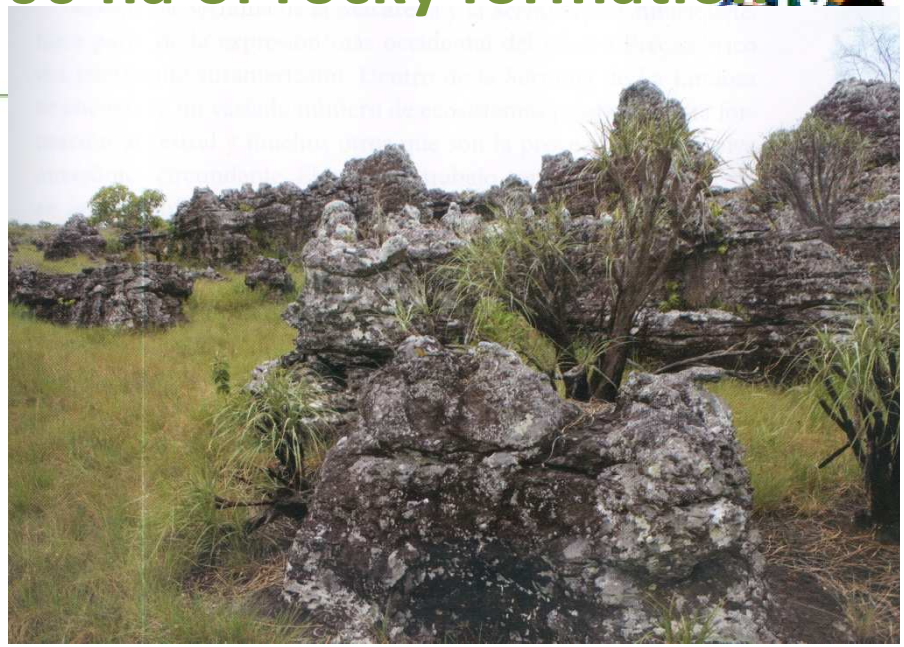


Magnoliopsida (class) (31)
Liliopsida (class) (22)

Instituto amazónico de investigaciones científicas SINCHI

MinAmbiente
Ministerio de Ambiente y Desarrollo Sostenible

Serrania de la Lindosa→ 12000 ha of rocky formation



Calliandra vaupesiana

Navia acaulis

Vellozia tubiflora

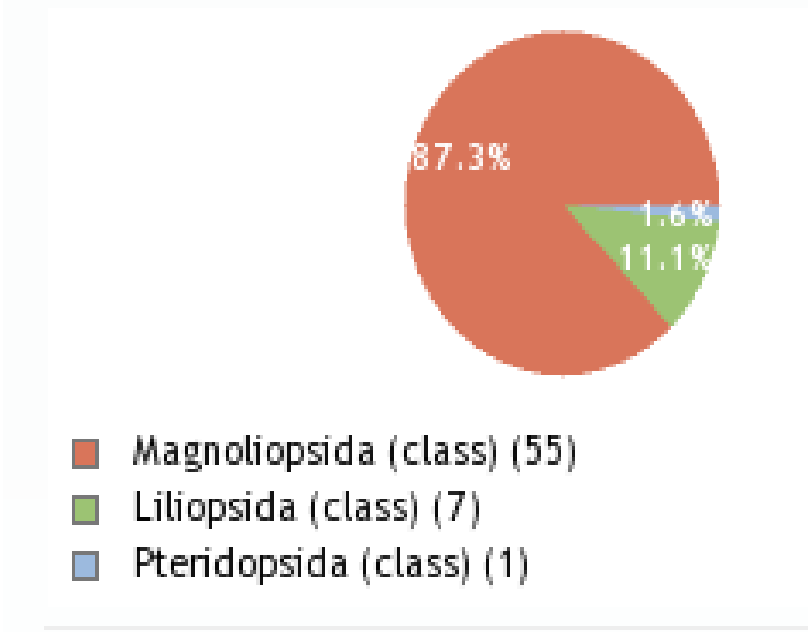
Chamaecrista viscosa

Paepalanthus formosus

30 emblematic species of the area were selected with at least two individuals

Código de barras plantas del herbario de la Universidad de los Andes

Santiago Madriñan, Ana Maria Bedoya, Mailyn Gonzalez

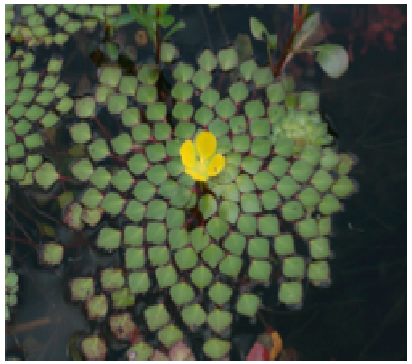


Universidad de los Andes

Laboratorio de Botánica y Sistemática

Ludwigia spp.

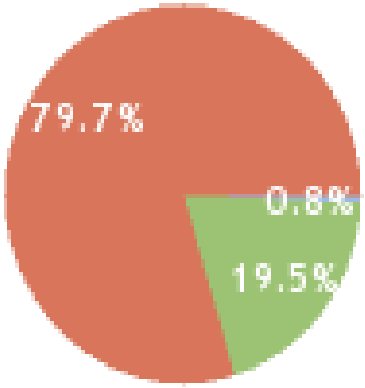
Paramo species



Family Onagraceae In Colombia 20 spp

Código de barras de hongos

Tatiana Sanjuan, Aida Vasco & Natalia Vargas



- Agaricomycetes (class) (98)
- Sordariomycetes (class) (24)
- Eurotiomycetes (class) (1)

Universidad de los Andes

IFS INTERNATIONAL FOUNDATION FOR SCIENCE

UNIVERSIDAD DE ANTIOQUIA 1803

Ectomycorrhizal Fungi

Russula cyanoxantha

Lactarius deceptivus

***Lactarius* deliciosus**

Order Russulales:
Family Russulaceae

Saprotrophic Fungi

ORDER AGARICALES: FAMILY AGARICACEAE

Macrolepiota colombiana

Order Agaricales:
Family Amanitaceae

Conclusión

- ADN es una herramienta eficiente para la identificación de especies a partir de fragmentos → Muy útil para identificar las especies involucradas en la seguridad aérea y el control de tráfico de especies

- Necesidad de apoyar las colecciones biológicas del país y construir en conjunto la base de referencia de la diversidad nacional!