

Snarge and Feathers: Identifying birdstrikes

Jim Whatton

Smithsonian Institution Feather Identification Lab



Smithsonian

National Museum of Natural History

Smithsonian Feather Identification Lab



National Museum of Natural History Division of Birds



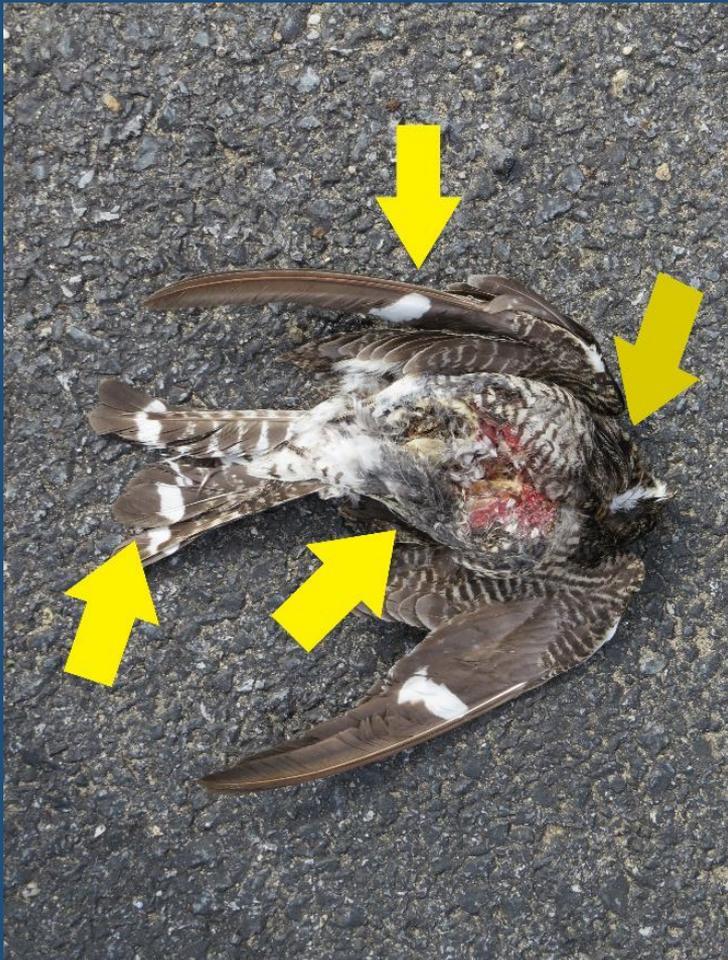
The Covid Year

- 7803 cases & 9298 identifications, a 16% decrease from FY19
- Smithsonian closed to visitors and staff Mar-2020
- Increase of turnaround time in 2020 (10 days)
 - Back to about average in 2021 (7 days)
 - Still within typical 5-10 Business days when factoring for weekends
- Altered LAB schedule for DNA work.



Birdstrike collection

Whole/partial carcass



Snarge/blood smear



Collecting Multiple impacts

- Up to 30% of all strikes received
- 44% of multiple impact >1 species
- Collect different impact points separately and label the bags
- If in doubt treat as possible multiple impact.



Two address dilemma

US Postal Service

Smithsonian Institution
Feather Identification Lab
E-600, MRC 116
PO Box 37012
Washington, D.C. 20013-7012

Courier / Shipping (FedEx, UPS, DHL, etc)

Smithsonian Institution
Feather Identification Lab
E-600, MRC 116
10th & Constitution Ave., NW
Washington, D.C. 20560

**US Postal Service mail sent to street address is irradiated

We recommend sending all damaging/high profile via a trackable service, preferably an overnight courier.

BIRDSTRIKE IDENTIFICATION



DNA



Whole Feather



Feather Microstructure



Whole Feather Analysis

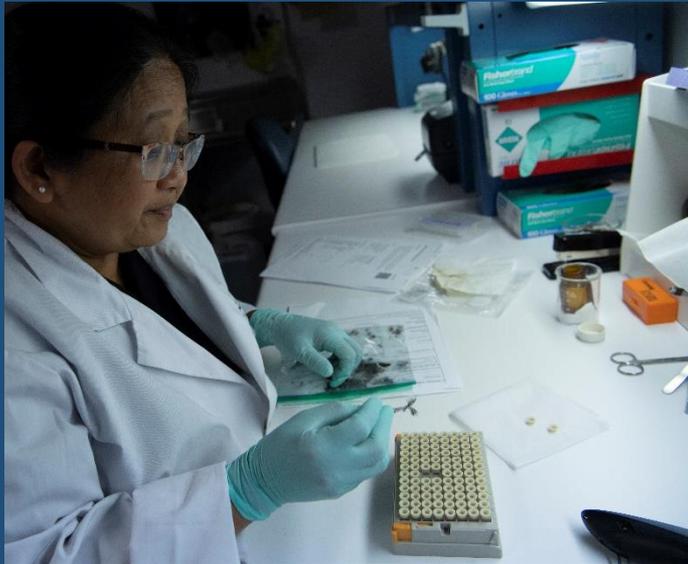


Northern Flicker



American Kestrel

DNA Analysis



Faridah sampling for DNA

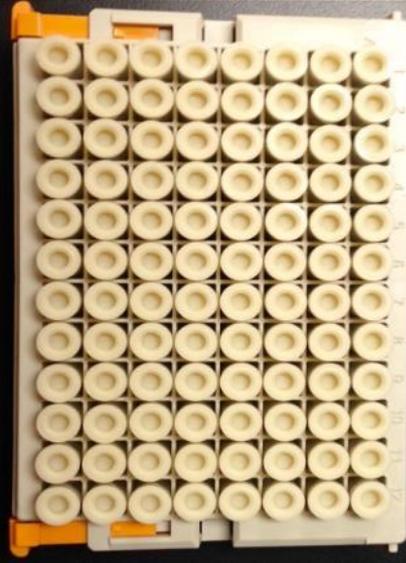


Plate of 96 samples



GenePrep extraction machine (ANG 2014)



Sequencer

BOLD SYSTEMS DATABASES IDENTIFICATION TAXONOMY WORKBENCH RESULTS

The BOLD Identification System (IDS) for COI accepts sequences from the 5' region of the mitochondrial Cytochrome c oxidase subunit I gene and re-identification when one is possible. Further validation with independent genetic markers will be desirable in some forensic applications.

Historical Databases: [Current](#) [Jul-2019](#) [Jul-2018](#) [Jul-2017](#) [Jul-2016](#) [Jul-2015](#) [Jul-2014](#) [Jul-2013](#) [Jul-2012](#) [Jul-2011](#) [Jul-2010](#) [Jul-2009](#)

Search Databases:

- All Barcode Records on BOLD (8,766,026 Sequences)**
Every COI barcode record on BOLD with a minimum sequence length of 500bp (excluding unvalidated library and includes records without species level identification). 1 species represented by only one or two specimens as well as all species with interim taxonomy. This search only returns a list of the nearest matches and does not do placement to a taxon.
- Species Level Barcode Records (4,278,074 Sequences/230,228 Species/107,584 Interim Species)**
Every COI barcode record with a species level identification and a minimum sequence length of 500bp. This includes many species represented by only one or two specimens with interim taxonomy.
- Public Record Barcode Database (2,230,001 Sequences/142,689 Species/55,553 Interim Species)**
All published COI records from BOLD and GenBank with a minimum sequence length of 500bp. This library is a collection of records from the published projects section.
- Full Length Record Barcode Database (2,772,703 Sequences/205,778 Species/86,125 Interim Species)**
Subset of our Species library with a minimum sequence length of 1400bp and containing both public and private records. This library is intended for short sequence ider maximum overlap with short reads from the barcode region of COI.

Enter fasta formatted sequences in the forward orientation:

```
CGTACCTGTAGTGGATGAGCTGGGATGATGGGACGGCA
CTTAGGCGCCCTATCCSSGAGBATTAGGAGAACTGTTAAGCCCTTAGG
AGATGATCAAACTACAACTGATGATGTTAGAGCCCATGCTCTGGGAATAA
TCTTCTTATAGTATACCAATCATATAATCGGAGGCTTTGGAACTGATTA
GTCCGCCCTTATATTTGGGACCCCGACATANGCATTTCCACGGATGAGCA
GATANSKCTTGGATTACTCTGASCTGCTCCCTCCCTCCCTCCCTCCCT
CCACAGTGGAGGTTGGTGGAGGAAAGAGGATGAGCCGCTATCTCCCTCA
GCTGGCAACCTAGCCCAAGCCGGAGCTCCCGTAGACCTGGCCATCTCTC
CCCTTATTTGCTGGTGTCTCTCTATCTATCTAGGAGACTGAGACTATATCA
GACCTGCTATACATATAMACACACAGCCCTCCACATCTACAAACCCCA
TTATCTGTATGATGCTCTCATCAGCGGGCTCTCTCTCTACTACTCTCC
CCAGTCTCTGCGCCGCGGCTCACAAATCTGCTCACAGATCGAAACCTAA
ACACGACCTCTCTCGAACCCGCTGGGAGGAGTACCCAGTACTATATCA
CATCTCTCTGATCTTTGGT
```

BOLD SYSTEMS DATABASES IDENTIFICATION TAXONOMY WORKBENCH RESULTS LOGIN

IDENTIFICATION ENGINE: RESULTS

Results Summary [Download](#)

Query ID	Best ID	Search DB	Tree	Top %	Graph	Low %
unlabeled_sequence	Zenaido macroura	COI SPECIES DATABASE		100.00		89.97

Query: unlabeled_sequence
Top Hit: Chordata Aves - Columbiformes - Zenaido macroura (100%)

Search Result:

The submitted sequence has been matched to *Zenaido macroura*. This identification is solid unless there is a very closely allied congeneric species that has not yet been analyzed. Such cases are rare.

A species page is available for this taxon:

Closest matching BIN (within 2%): [BIN Page](#)

For a hierarchical placement - a neighbor-joining tree is provided: [TREE BASED IDENTIFICATION](#)

Identification Summary

Taxonomic Level	Taxon Assignment	Probability of Placement (%)
Phylum	Chordata	100
Class	Aves	100
Order	Columbiformes	100
Family	Columbidae	100
Genus	Zenaido	100
Species	Zenaido macroura	100

Similarity Scores of Top 100 Matches

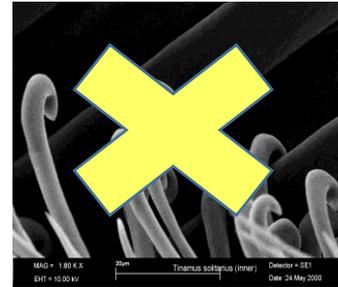
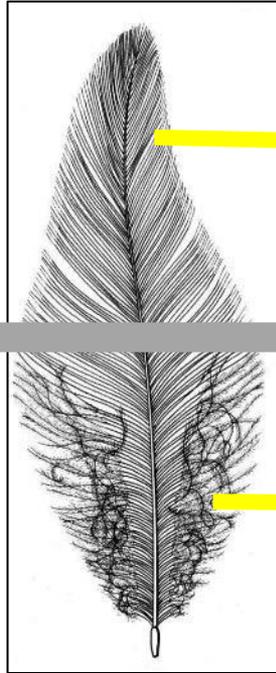
Top 20 Matches

Phylum	Class	Order	Family	Genus	Species	Subspecies	Similarity (%)	Status
Chordata	Aves	Columbiformes	Columbidae	Zenaido	macroura		100	Published
Chordata	Aves	Columbiformes	Columbidae	Zenaido	macroura		100	Published
Chordata	Aves	Columbiformes	Columbidae	Zenaido	macroura		100	Published

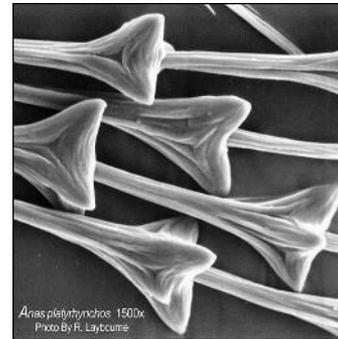
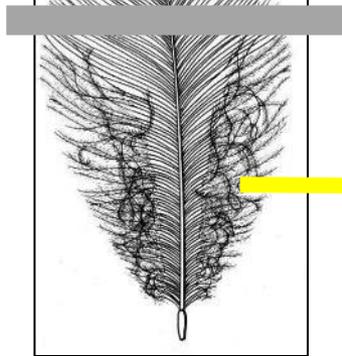
Display: [Top 20](#)

Microscopic Analysis

Pennaceous

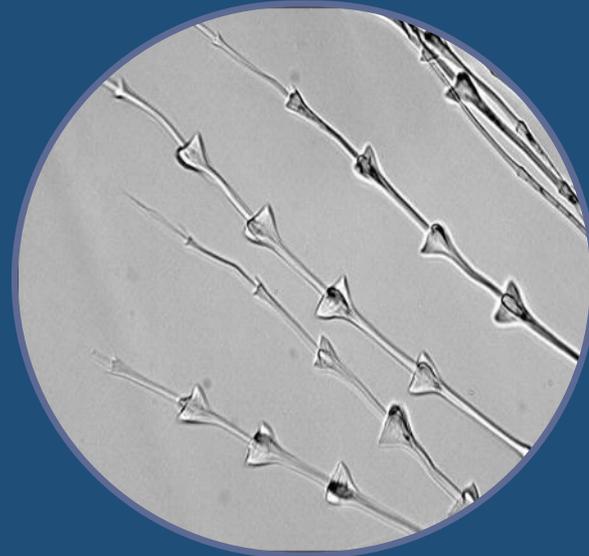


Plumulaceous



Pluck don't cut feathers

Microscopic Analysis



© Carlos Escamilla, TX, Laredo, June 2010



© tsiya, FL, January 2009

Northern Bobwhite

Mallard

Collecting birdstrikes tips

Whole/ partial carcass found

- Pluck a variety of feathers including
 - wing, tail, breast, back, any feathers with color or pattern
- Do not cut feathers
- Limit amount of 'chunks' of tissue
- Don't send entire/partial carcass

Snarge/blood smear

- Scrape off all snarge if possible
- Use alcohol
 - Never use water, bleach, or cleansers
- Include feathers if available
- Limit amount of 'chunks' of tissue

-If both whole feathers and snarge are available, collect both.

-Let sample dry before sealing in a bag.

-If extremely damaging or high profile strike, collect all available evidence.

-Each impact point on an aircraft and each carcass should be treated as a separate sample.

Photo Identifications

- Feather Lab can conduct photo identifications of whole carcasses
 - Mostly done for military cases since SI has to enter all wildlife ids
- Characters of a good photo:
 - Full frame, in focus, no obstructions
 - Scale bar
 - Multiple angles
- Upload file in the BASH tab of AFSAS/RMI
- Save carcass in freezer until you get identification or request for additional remains.



Birdstrike references

- **Bird Strikes: How to Collect, Ship Remains, and Have Bird Remains Identified**
 - a USDA/Smithsonian production
 - YouTube/Google 'birdstrike collecting video'
 - Download - http://www.faa.gov/airports/airport_safety/wildlife/smithsonian/
- FAA Wildlife: <https://wildlife.faa.gov/home>
- AFSAS/RMI: <https://afsas.safety.af.mil/Home.do>
- Birdstrike Committee USA: <http://www.birdstrike.org/>
- Feather Lab contact info
 - General phone number - 202-633-0801
 - Carla Dove, dovec@si.edu
 - Marcy Heacker, heckerm@si.edu
 - Jim Whatton, whattonj@si.edu
 - Faridah Dahlan, dahlanno@si.edu
 - Sarah Luttrell, luttrells@si.edu

