



HARMONIZING TAXONOMIC RESOURCES IS NECESSARY FOR NOVEL INSIGHTS INTO BAT ROOSTING DATASET

AJA SHERMAN, CULLEN GEISELMAN, NANCY SIMMONS,
JORRIT POELEN, DEEANN REEDER, NATHAN UPHAM,
KENDRA PHELPS, DONAT AGOSTI





Biodiversity Exchange on Host and Pathogen Interactions (BE HaPI)

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Simmons, Nancy; Poelen, Jorrit; Reeder,
DeeAnn; Upham, Nathan; Phelps, Kendra;
Agosti, Donat



Aja Sherman

Bat Eco-Interaction
Project



**Cullen
Geiselman**

Bat Eco-Interaction
Project



Nancy Simmons

American Museum of
Natural History



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UC Santa Barbara



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Bucknell University



Nathan Upham

Arizona State
University



Kendra Phelps

EcoHealth Alliance



Donat Agosti

Plazi





Bats as Reservoirs for Human Zoonotic Pathogens



The Nutritional Ecology Lab – *R. ferrumequinum* roosting with *M. emarginatus* and *Asellia tridens*

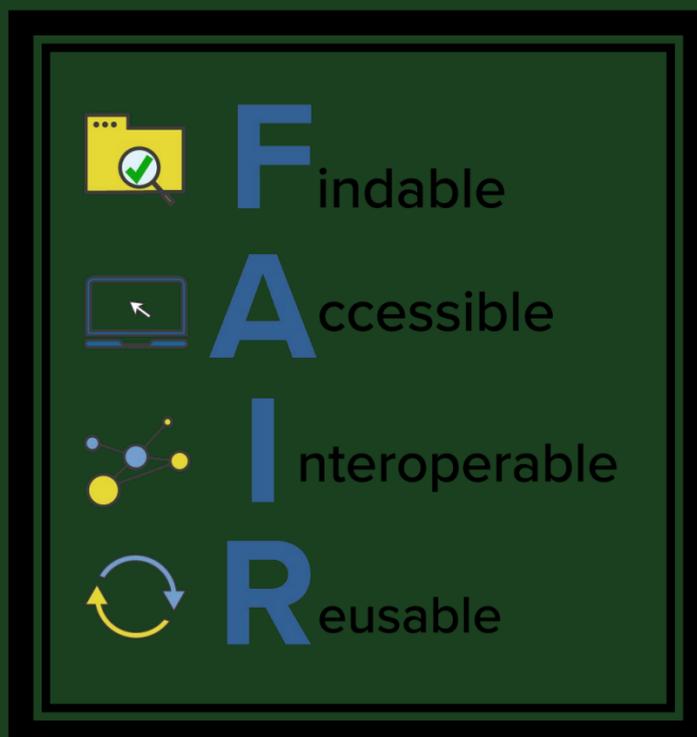




Co-Roosting



FAIR Data – extracted from publications



Viewpoint

Liberating host–virus knowledge from biological dark data

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Connecting basic data about bats and other potential hosts of SARS-CoV-2 with their ecological context is crucial to the understanding of the emergence and spread of the virus. However, when lockdowns in many countries started in March, 2020, the world’s bat experts were locked out of their research laboratories, which in turn impeded access to large volumes of offline ecological and taxonomic data. Pandemic lockdowns have brought to attention the long-standing problem of so-called biological dark data: data that are published, but disconnected from digital knowledge resources and thus unavailable for high-throughput analysis. Knowledge of host-to-virus ecological interactions will be biased until this challenge is addressed. In this Viewpoint, we outline two viable solutions: first, in the short term, to interconnect published data about host organisms, viruses, and other pathogens; and second, to shift the publishing framework beyond unstructured text (the so-called PDF prison) to labelled networks of digital knowledge. As the indexing system for biodiversity data, biological taxonomy is foundational to both solutions. Building digitally connected knowledge graphs of host–pathogen interactions will establish the agility needed to quickly identify reservoir hosts of novel zoonoses, allow for more robust predictions of emergence, and thereby strengthen human and planetary health systems.



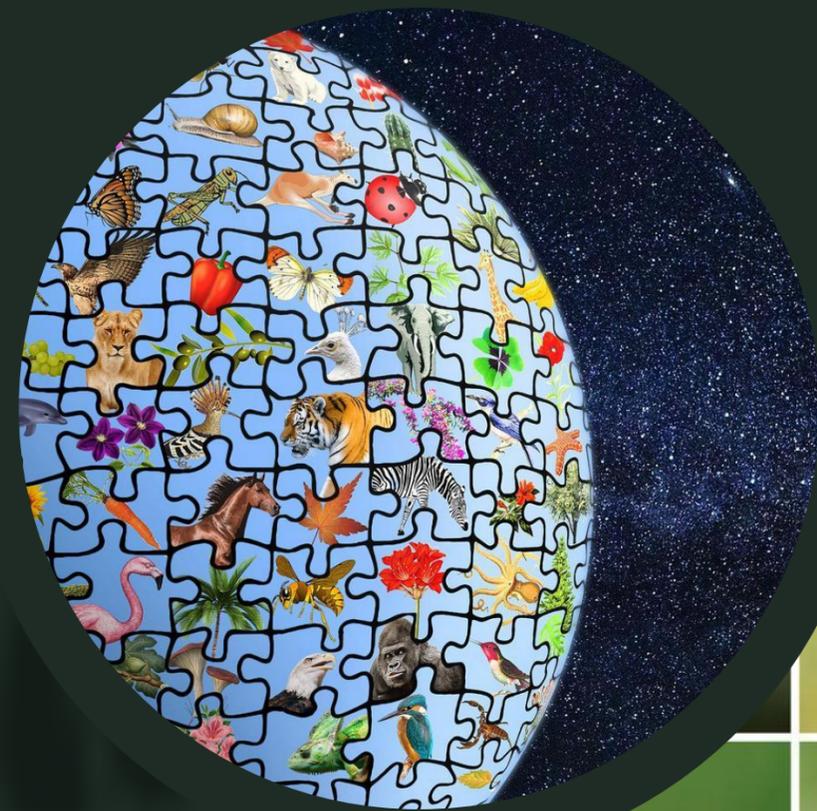
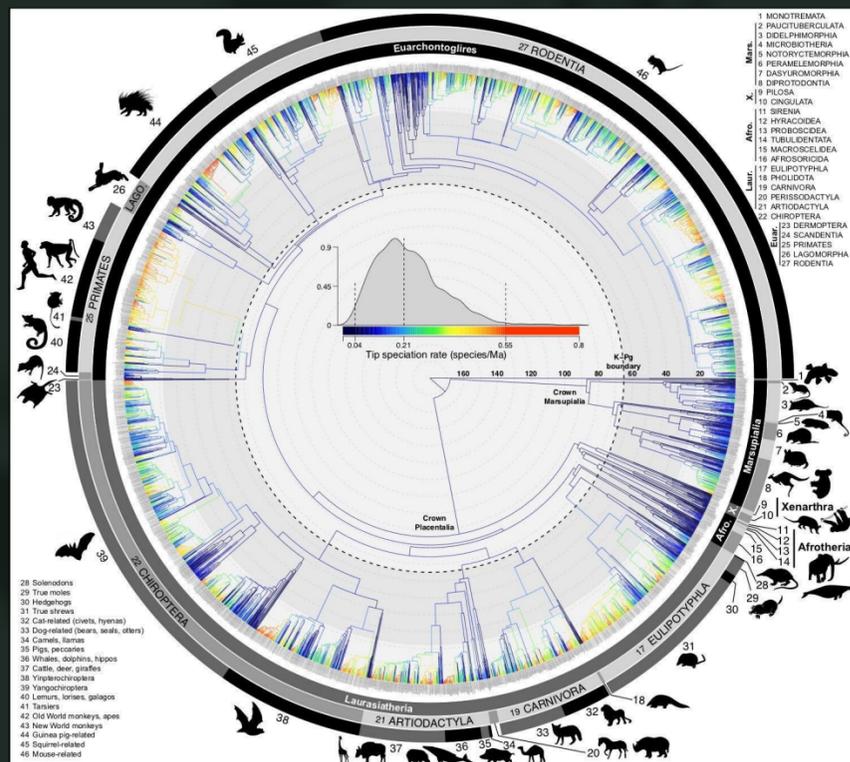
Lancet Planet Health 2021

Published Online
September 22, 2021
[https://doi.org/10.1016/S2542-5196\(21\)00196-0](https://doi.org/10.1016/S2542-5196(21)00196-0)

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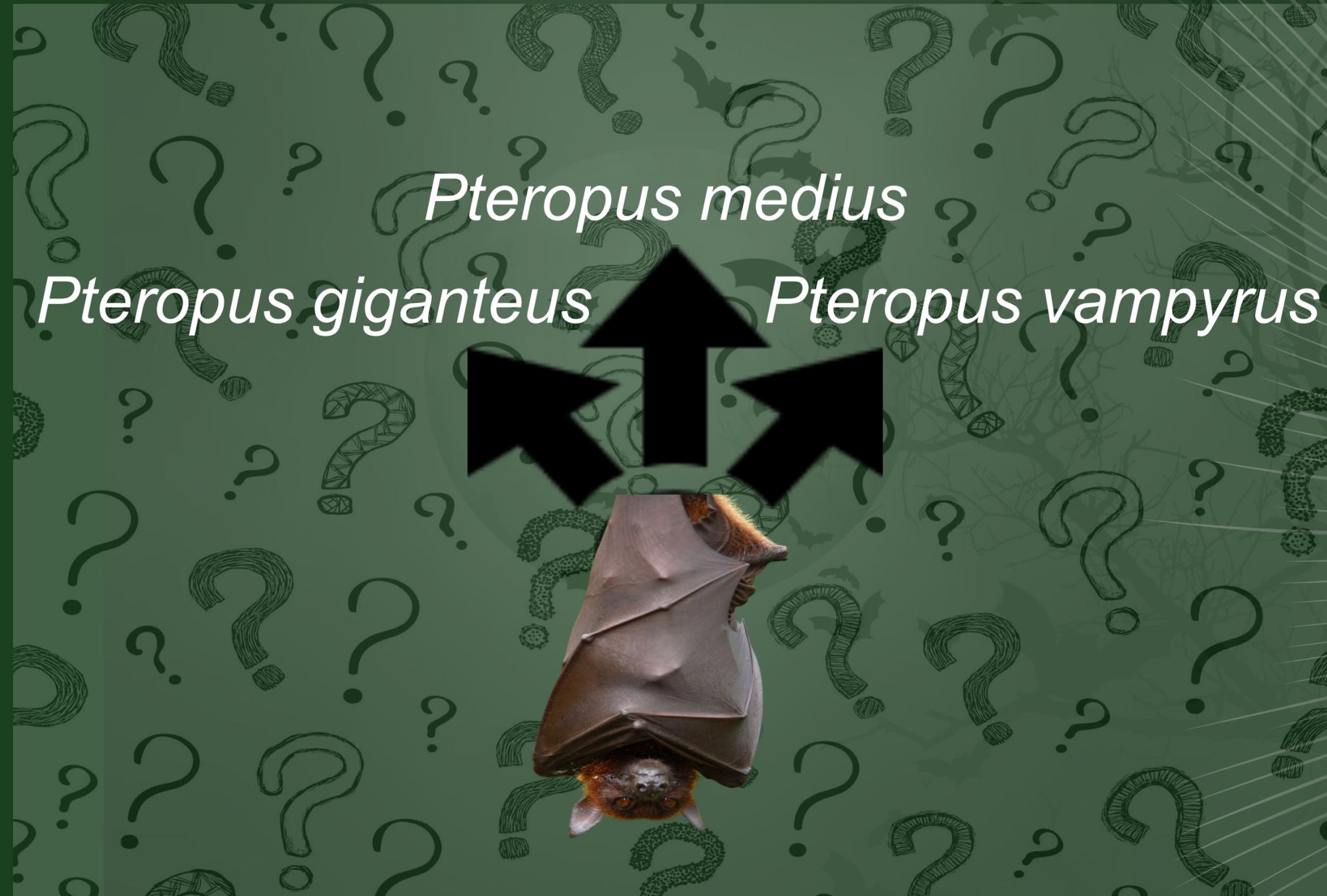


Taxonomy in Biodiversity Studies

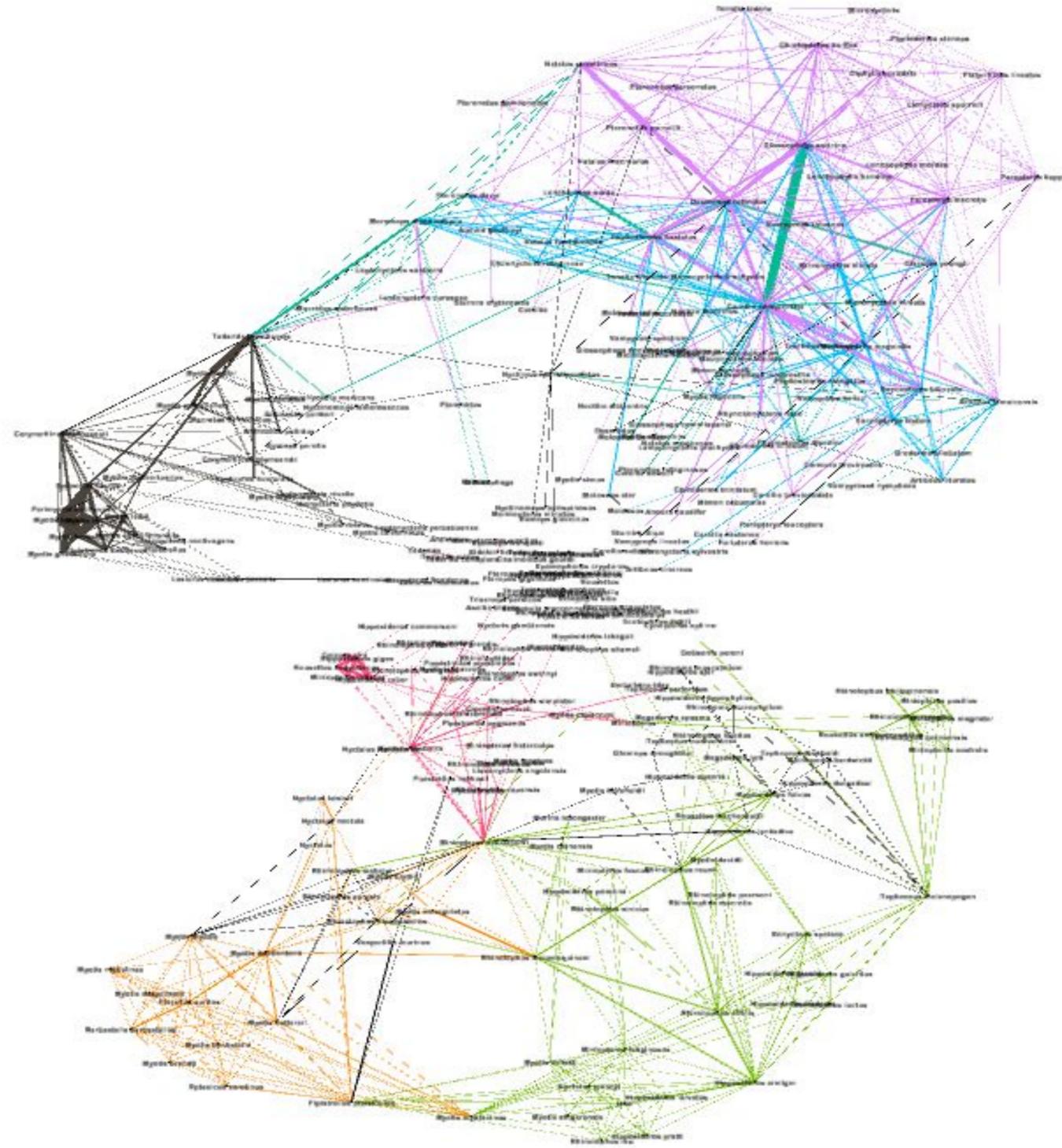


Upham NS, Esselstyn JA, Jetz W (2019) Inferring the mammal tree: Species-level sets of phylogenies for questions in ecology, evolution, and conservation. PLoS Biol 17(12): e3000494. <https://doi.org/10.1371/journal.pbio.3000494>

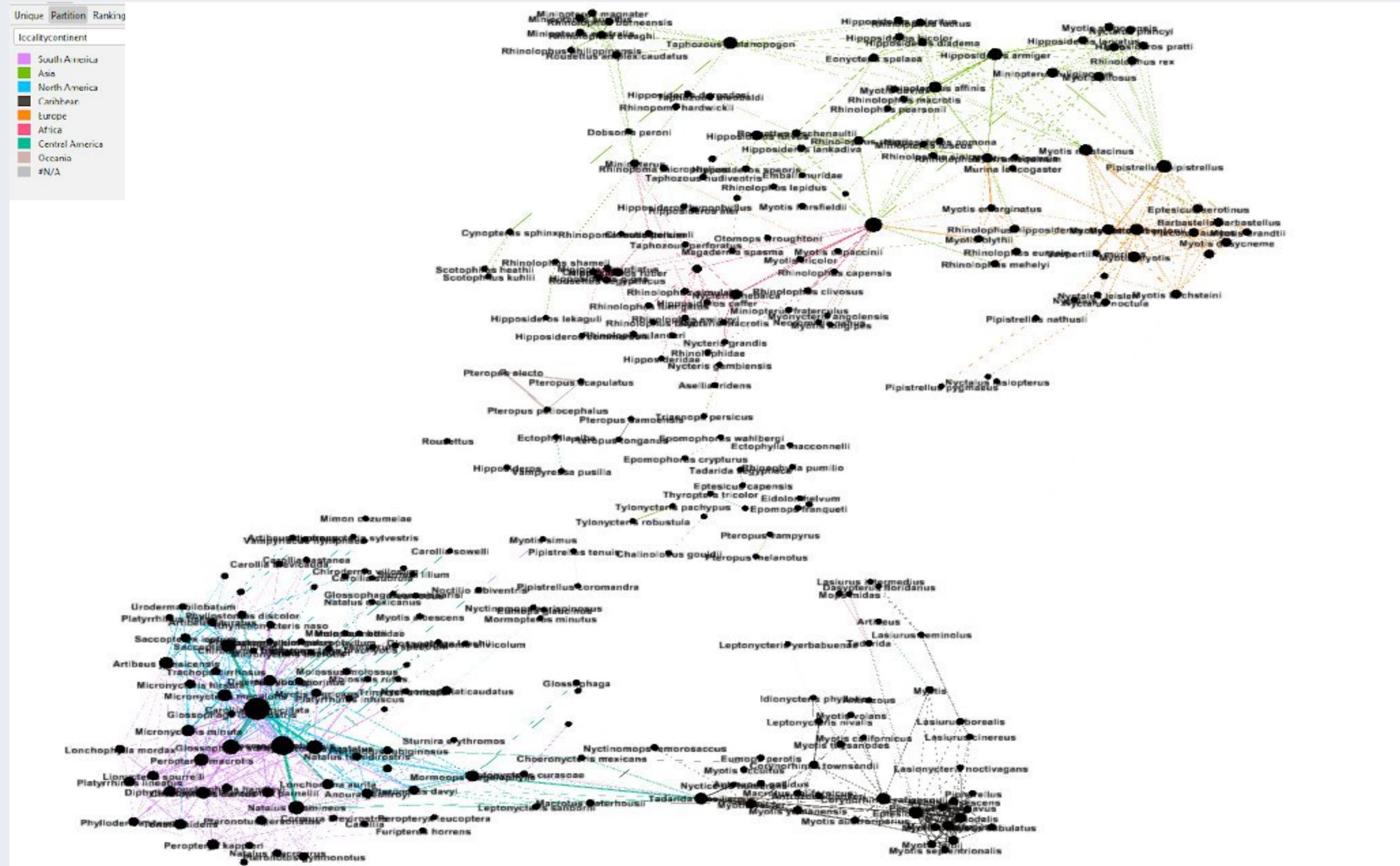
Unharmonized Treatments



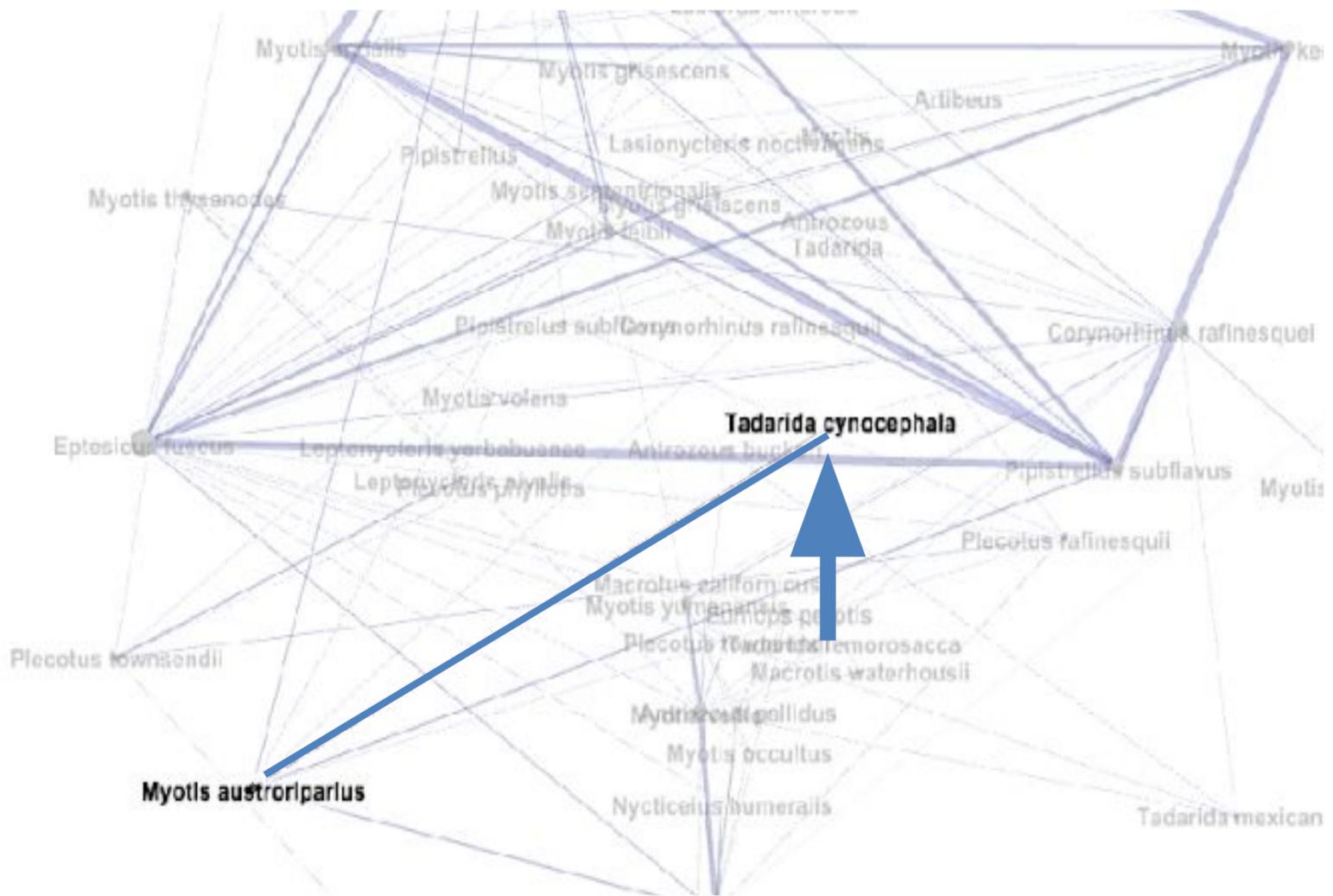
Challenges and Opportunities with Taxonomy



Challenges and Opportunities with Taxonomy

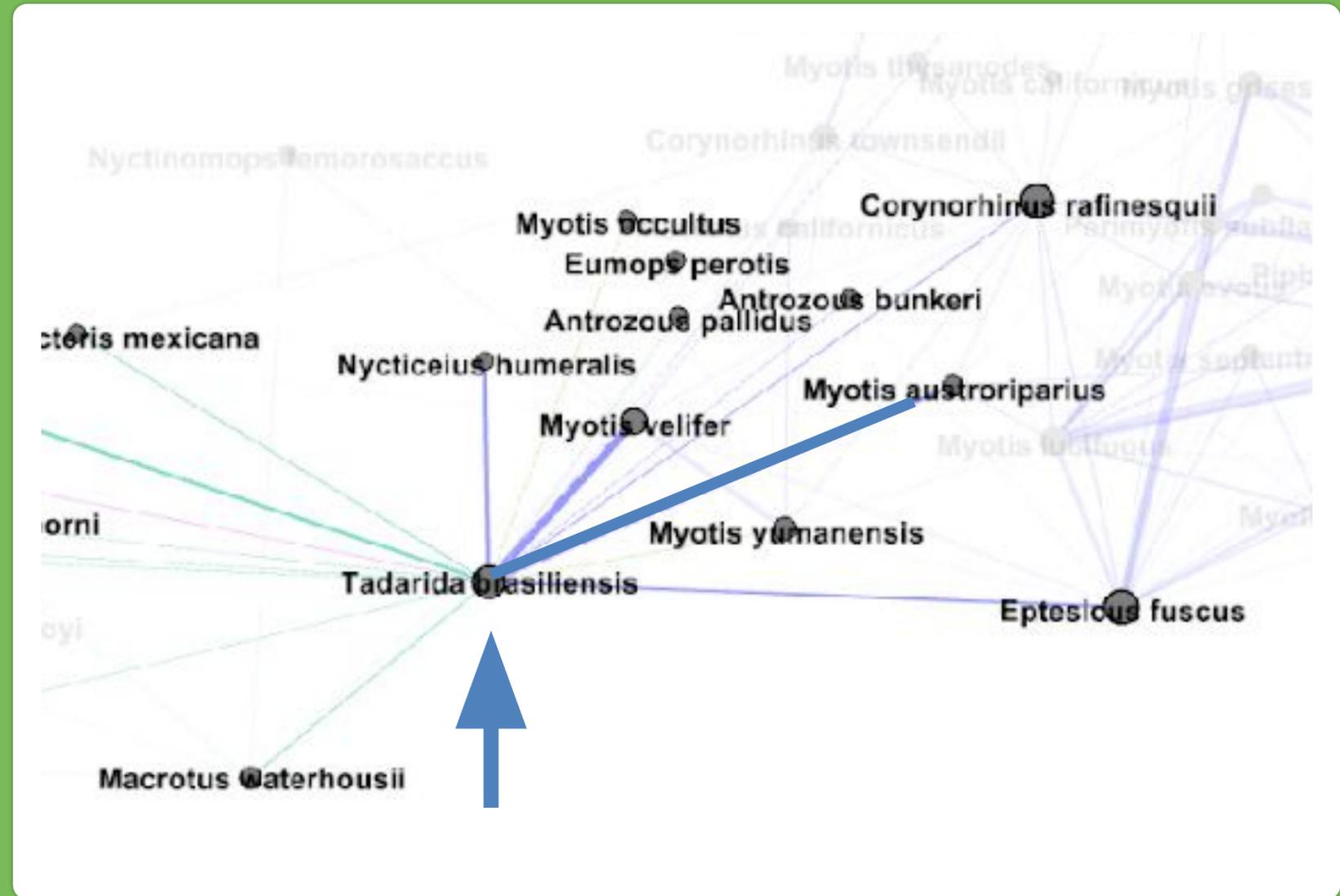


Resolved Taxonomy



Before

Tadarida cynocephala now considered a subspecies of *Tadarida brasiliensis*



After

Taxonomic Authorities

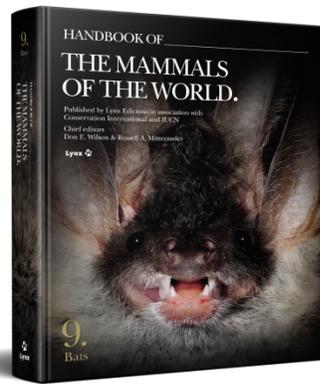
Mammal
Species of
the World

BatNames.org

mammaldiversity.org

Handbook
Mammals of
the World





WORKFLOW

HMW 2019

Plazi

Treatment Bank

Miller

Alignment

OCR

GoldenGate

Preston, jq,
mlr+

[schema.jq](#)

Team

paper pages
extracted from
physical HMW
2019 copy

turn a OCR'ed
pdf into a
structured xml

json and files are
derived from a
Preston tracked
version of Plazi's
treatment bank

converts Preston
generated json
into tabular csv,
parsing text by
category

manual name
alignment

| BatNames_Full_Treatment | | | | | | | | | | | | | | GBIF_Backbone | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------|---------|-------|-----------|--------|------|-------|---------|---------|--------|--------|--------|--------|------|---------------|--------|--------|---------|--------------------|------------------------|--------|-------|--------|--------|-------|-------|-------|-------|--------|--------|---------|---------|----------------|--------|------------------------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|----|
| name_batnames | Genus | Subge | Specie | Autho | Date | Paren | Citati | Pages | Com | Synon | Type | Distri | CITE | IUCN | Com | source | verbat | sciname_GBIF | name_GBIF | key | match | confid | status | rank | kingd | phylu | class | order | family | genus | specie | canon | autho | docOrigin | name_MDD | id | phylos | main | other | subcla | infrac | magu | super | order | subor | in |
| Anoura luismanueli | Anour | | luisma | Molin | 1994 | 0 | Trop. | 0.3444 | Luis | None. | Venez | Andes | Not | Least | Distin | GBIF | Anour | Anoura | Anoura luismanueli | 6.00E+ | EXAC | 99 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Anour | Anour | Anour | Molin | Mammal | Anoura luismanueli | 1.00E+ | 2.30E+ | Luis | Molin | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA |
| synonym of Anoura geoffroyi | | | | | | | | | | | | | | | | GBIF | Anour | Anoura peruana | Anoura peruana | 8.00E+ | EXAC | 99 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Anour | Anour | Anour (Tschu) | Mammal | Anoura peruana | 1.00E+ | 2.30E+ | Tschu | | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Anthops ornatus | Antho | | ornatu | Thom | 1888 | 0 | Ann. | ser. 6. | Flowe | None. | Solom | Solom | Not | Vulner | See | GBIF | Antho | Anthops ornatus | Anthops ornatus | 1.00E+ | EXAC | 99 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Hippo | Antho | Antho | Antho | Mammal | Anthops ornatus | 1.00E+ | 2.30E+ | Solom | Flowe | Theria | Placen | Boreo | Lauras | CHIR | PTER | NA | |
| Antrozous pallidus | Antroz | | pallidu | Le | 1856 | 1 | Proc. | 0.5951 | Pallid | <->can | USA, | Queret | Not | Least | Includ | GBIF | Antroz | Antrozous | Antrozous pallidus | 2.00E+ | EXAC | 99 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Vesper | Antroz | Antroz | Antroz (LeCo) | Mammal | Antrozous pallidus | 1.00E+ | 2.30E+ | Pallid | | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Aproteles bulmerae | Aprote | | bulme | Menzi | 1977 | 0 | Aust. | 30:31:0 | Bulme | None. | Papua | Mainl | Not | Critica | Origin | GBIF | Aprote | Aproteles | Aproteles bulmerae | 2.00E+ | EXAC | 99 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Pterop | Aprote | Aprote | Aprote | Menzi | Mammal | Aproteles bulmerae | 1.00E+ | 2.30E+ | Bulme | | Theria | Placen | Boreo | Lauras | CHIR | PTER | NA |
| Ardops nichollsi | Ardop | | nicholl | Thom | 1891 | 1 | Ann. | ser. 6. | Tree | <->b | Domin | Lesser | Not | Least | Subsp | GBIF | Ardop | Ardops nichollsi | Ardops nichollsi | 2.00E+ | EXAC | 99 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Ardop | Ardop | Ardop (Thom) | Mammal | Ardops nichollsi | 1.00E+ | 2.30E+ | Tree | Lesser | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Arielulus circumdatus | Arieliu | | circum | Temm | 1840 | 1 | Mono | 0.2319 | Bronz | <->dru | Indone | Java | Not | Least | Heller | GBIF | Arieliu | Arielulus | Arielulus circumdatus | 4.00E+ | EXAC | 99 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Vesper | Arieliu | Arieliu | Arieliu (Tem) | Mammal | Arielulus circumdatus | 1.00E+ | 2.30E+ | Bronz | Black- | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Arielulus cuprosus | Arieliu | | cupros | Hill & | 1984 | 1 | Bull. | 52:12:0 | Coppe | None. | Malay | Borne | Not | Vulner | | GBIF | Arieliu | Arielulus cuprosus | Arielulus cuprosus | 4.00E+ | EXAC | 99 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Vesper | Arieliu | Arieliu | Arieliu (Hill) | Mammal | Arielulus cuprosus | 1.00E+ | 2.30E+ | Coppe | Coppe | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Arielulus societatis | Arieliu | | societa | Hill | 1972 | 1 | Bull. | 23:34 | So | | | | | | | GBIF | Arieliu | Arielulus | Arielulus societatis | 4.00E+ | EXAC | 99 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Vesper | Arieliu | Arieliu | Arieliu (Hill) | Mammal | Arielulus societatis | 1.00E+ | 2.30E+ | Social | Ben | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Ariteus | aves | | Gray | 1831 | 1 | Zool. | 1:37 | Jan | | | | | | | | GBIF | Ariteu | Ariteus flavescens | Ariteus flavescens | 2.00E+ | EXAC | 99 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Ariteu | Ariteu | Ariteu (G) | Mammal | Ariteus flavescens | 1.00E+ | 2.30E+ | Jamaic | Naseb | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Thainycteris | Thainy | | torquatus | Csorb | 1999 | 1 | J. | 248: | Ne | | | | | | | GBIF | Thain | Thainycteris | Thainycteris torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Vesper | Thain | Thain | Thain | Mammal | Thainycteris torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | K. | 1906 | 0 | Ann. | ser. 7. | Eq | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | Chord | Mam | Chirop | Phyllo | Artibe | Artibe | Artibe | Mammal | Artibeus torquatus | 1.00E+ | 2.30E+ | Neckl | Formo | Theria | Placen | Boreo | Lauras | CHIR | VESP | NA | |
| Artibeus | Artibe | | torquatus | Handl | 1987 | 0 | Fieldia | 41:44:0 | La | | | | | | | GBIF | Artibe | Artibeus | Artibeus torquatus | 1.00E+ | FUZZ | 85 | ACCE | SPECI | Anima | | | | | | | | | | | | | | | | | | | | | |



Applications

- Taxonomic revision
- Relational databases
- Data mining
- Bioinformatics
- Data aggregates
- Ecologists
- Museum collection staff

All Names

| Name_MSW3 | Name_HMW | Name_BatNames | Name_MDD | Name_IUCN | Name_BatNames_2023 |
|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|
| Centronycteris centralis | Centronycteris centralis | Centronycteris centralis | Centronycteris centralis | Centronycteris centralis | Centronycteris centralis |
| Centronycteris maximiliani | Centronycteris maximiliani | Centronycteris maximiliani | Centronycteris maximiliani | Centronycteris maximiliani | Centronycteris maximiliani |
| Centurio senex | Centurio senex | Centurio senex | Centurio senex | Centurio senex | Centurio senex |
| Chaerephon aloysiisabaudiae | Chaerephon aloysiisabaudiae | Mops aloysiisabaudiae | Mops aloysiisabaudiae | Chaerephon aloysiisabaudiae | Mops aloysiisabaudiae |
| Chaerephon ansorgei | Chaerephon ansorgei | Mops ansorgei | Mops ansorgei | Chaerephon ansorgei | Mops ansorgei |
| | Chaerephon atsinanana | Mops atsinanana | Mops atsinanana | Chaerephon atsinanana | Mops atsinanana |
| Chaerephon bemmeleni | Chaerephon bemmeleni | Mops bemmeleni | Mops bemmeleni | Chaerephon bemmeleni | Mops bemmeleni |
| Chaerephon bivittatus | Chaerephon bivittatus | Mops bivittatus | Mops bivittatus | Chaerephon bivittatus | Mops bivittatus |
| Chaerephon bregullae | Chaerephon bregullae | Mops bregullae | Mops bregullae | Chaerephon bregullae | Mops bregullae |
| Chaerephon chapini | Chaerephon chapini | Mops chapini | Mops chapini | Chaerephon chapini | Mops chapini |

Unharmonized Treatments

| name_MS3 | name_HMW2019 | name_batnames | name_MDD | taxonomic_notes_concatenated |
|----------|---|-----------------------------|--------------------------------------|---|
| N/A | synonym of <i>Artibeus lituratus palmarum</i> | <i>Artibeus intermedius</i> | synonym of <i>Artibeus lituratus</i> | <p>HMW: Under <i>A. lituratus</i> - Subgenus <i>Artibeus</i> . May include cryptic diversity (see Larsen et al. 2010). Includes <i>palmarum</i> but not <i>fallax</i> , <i>hercules</i> , or <i>praeceps</i> (Koopman, 1968, 1978b), Handley (1987), and Marques-Aguiar (1994). Includes <i>intermedius</i> ; see Jones and Carter (1976) and Marques-Aguiar (1994), (1994), but see also Davis (1984) and Wilson (1991). It is not appropriate to treat <i>intermedius</i> as a subspecies of <i>lituratus</i> because it supposedly co-occurs with other populations of <i>lituratus</i> (referred to <i>palmarum</i> , which has priority) at several Central American localities (Davis, 1984). Because there are no characters that unambiguously separate <i>palmarum</i> and <i>intermedius</i> (Davis, 1984; Marques-Aguiar, 1994; Rodrigo Medellin, pers. comm.), it seems most likely that <i>intermedius</i> simply represents individuals of <i>palmarum</i> that fall at the lower end of the normal range of size variation. Accordingly, we treat <i>intermedius</i> as a junior synonym of <i>A. lituratus palmarum</i> . Phylogeography discussed by Phillips et al. (1991) and Ditchfield(2000).</p> <p>BatNames: Subgenus <i>Artibeus</i> . Apparently distinct from <i>lituratus</i> , see Davis (1984), Wilson (1991), Marchã;n-Rivadeneira et al. (2012), and Larsen et al. (2013); but see also Marques-Aguiar (1994), Marques-Aguiar (2007), Guerrero et al. (2008), Hooper et al. (2008), Lim et al. (2004), Redondo et al. (2008), and Simmons (2005). See Larsen et al. (2013) for a distribution map.</p> <p>MDD: previously included <i>A. intermedius</i>, although that taxon is still regularly considered a synonym of <i>A. lituratus</i>; limited molecular and morphological distinctions currently justify the recognition of <i>A. intermedius</i> as a distinct species</p> <p>IUCN: N/A</p> <p>msw3: N/A</p> |

Interpretation



Analysis

| no_mat ch_MS W_HM W | no_mat ch_MS W_batn ames | no_mat ch_MS W_MD D | no_mat ch_MS W_IUC N | no_mat ch_MS W_batn ames20 23 | no_mat ch_HM W_batn ames | no_mat ch_HM W_MD D | no_mat ch_HM W_IUC N | no_mat ch_HM W_batn ames20 23 | no_mat ch_batn ames_ MDD | no_mat ch_batn ames_I UCN | no_mat ch_batn ames_b atname s2023 | no_mat ch_MD D_IUC N | no_mat ch_MD D_batn ames20 23 | no_mat ch_IUC N_batn ames20 23 | spelling |
|------------------------------|-----------------------------------|------------------------------|-------------------------------|---|-----------------------------------|------------------------------|-------------------------------|---|-----------------------------------|------------------------------------|--|-------------------------------|---|--|----------|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | |
| 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 503 | 569 | 581 | 333 | 556 | 208 | 193 | 264 | 229 | 103 | 313 | 111 | 329 | 130 | 308 | |

Synonyms and Subspecies

| subspecies_MSW_interpreted | synonym_MSW_interpreted | subspecies_HMW_interpreted | synonym_HMW_interpreted | subspecies_batnames_interpreted | synonym_batnames_interpreted | synonym_MDD_interpreted |
|---|---|----------------------------|-------------------------|---|---|--|
| caraccioli, major | major - ornatus | | ornatus | ornatus | | <i>caraccioli</i> |
| | | | | | | <i>major, ornatus</i> |
| | <i>guianensis, maximus, nasutus, nelsoni</i> | | | | <i>guianensis, maximus, nasutus, nelsoni</i> | <i>spectrum, nelsoni</i> |
| rueppellii, coxi, fuscipes, pulcher, senegalensis, vernayi | <i>hypoleucus, temminckii; vernayi - leucomelas</i> | | | coxi, fuscipes, pulcher, senegalensis, vernayi | <i>hypoleucus, temminckii; vernayi - leucomelas</i> | <i>temminckii, rueppellii, hypoleucus, sennaariensis, pulcher, senarensis, fuscipes, coxi, vernayi, leucomelas, senegalensis</i> |



Versioning

The screenshot shows a Zenodo record page for a preprint. The header includes the Zenodo logo, a search bar, and navigation links for 'Upload' and 'Communities'. The user 'ap@batoco.org' is logged in. The record is dated May 2, 2023, and is marked as a 'Preprint' and 'Open Access'. The title is 'A Standardized Review of Bat Names Across Multiple Taxonomic Authorities'. The authors listed are Sherman, A.J., Coaritean, Dales, Franks, Jeff, Summers, Nancy, Foster, David, Upton, Nathan, Papp, Kandra, and Igosh, Donat. The abstract discusses the challenges of taxonomic nomenclature and the need for a standardized review across multiple authorities. The page shows 32 views and 8 downloads. There is a 'Download' button and a 'View version' button. The 'About' section features the OpenAIRE logo. The 'Publication date' is May 2, 2023, and the DOI is 10.21203/rs.3.rs-2814792/v1. The 'Keyword(s)' section includes 'Taxonomic Authorities' and 'Taxonomic Alignment'. The 'Related Identifiers' section lists two identifiers: 10.1146/annurev-animal-080719-095900 and 10.1017/etn.2023.111. The page also includes a 'Preview' section with a 'Cannot preview file' message and a 'For questions, please write to us through <https://help.zenodo.org/en/contact-us/>'.

<https://zenodo.org/record/7915722#.ZG69vXbMK39>

<https://jhpoelen.nl/bat-taxonomic-alignment/>



Interpretation

| | MSW3 | HMW | BatNames | MDD | IUCN | BatNames 2023 |
|---------------------|-------------|------------|-----------------|------------|-------------|--------------------------|
| Date Published | 2005 | 2019 | 2022 | 2022 | 2022 | 2023 |
| Accepted Species | 1113 | 1409 | 1465 | 1459 | 1329 | 1457 |
| Accepted Genera | 232 | 238 | 238 | 225 | 203 | 233 |

Table 4. Taxonomic Authorities



Interpretation

| | MSW | HMW | BatNames | MDD | IUCN | BatNames2023 |
|----------|-----|-----|----------|-----|------|--------------|
| MSW | | 541 | 571 | 585 | 329 | 563 |
| HMW | | | 209 | 192 | 300 | 241 |
| BatNames | | | | 105 | 314 | 119 |
| MDD | | | | | 332 | 138 |
| IUCN | | | | | | 315 |

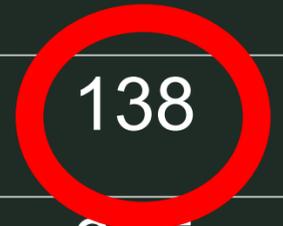


Table 3. Unharmonized Names out of 1532 Name Concepts



⚠ work in progress ⚠

A Standardized Review of Bat Names Across Multiple Taxonomic Authorities

Cite as:

Sherman, Aja, Geiselman, Cullen, Poelen, Jorrit, Simmons, Nancy, Reeder, DeeAnn, Upham, Nathan, & Phelps, Kendra. (2023). A Standardized Review of Bat Names Across Multiple Taxonomic Authorities (0.1) [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.7915722>

The taxonomic boundaries of species and higher-level taxa change relatively frequently as knowledge of population structure and evolutionary relationships improves, and older hypotheses are reframed. For the order Chiroptera (bats), valid names have long been assessed by multiple authorities, but differences among the resulting classifications largely remain unharmonized amongst authorities. We collected and aligned treatments across three primary taxonomic authorities for Chiroptera to create a single dynamic and versioned name translation tool. The resulting Bat Taxonomy Alignment will expedite future taxonomic assessments. The complexities uncovered in this alignment suggest the need for more explicit tracking of taxonomic concepts and usage of names in the future, particularly since biodiversity data (including hosts of zoonotic diseases) are cataloged and tracked using taxonomic names.

DOI [10.5281/zenodo.7915722](https://doi.org/10.5281/zenodo.7915722)

archived [swh:1:dir:9ba2b7ef8c75873d945ccfd19845df28778e7da8](https://swh.io/1/dir/9ba2b7ef8c75873d945ccfd19845df28778e7da8)

Do you have questions or suggestions? Please edit this page, join our weekly meeting, or open an issue.

Table 1. BTA@26d368c7 Resources in XSLX, Google sheet, TSV, CSV, and JSON-L formats.

| name | description |
|------------------------------|---|
| bta.xlsx | in proprietary Excel format. |
| Google sheet | Read-only version hosted on Google sheets |
| bta.tsv | as Tab Separated Values |
| bta.csv | as Comma Seperated Values |
| bta.json | as JSON Lines format |

status: Agreement Index values calculation done

User Friendly Link

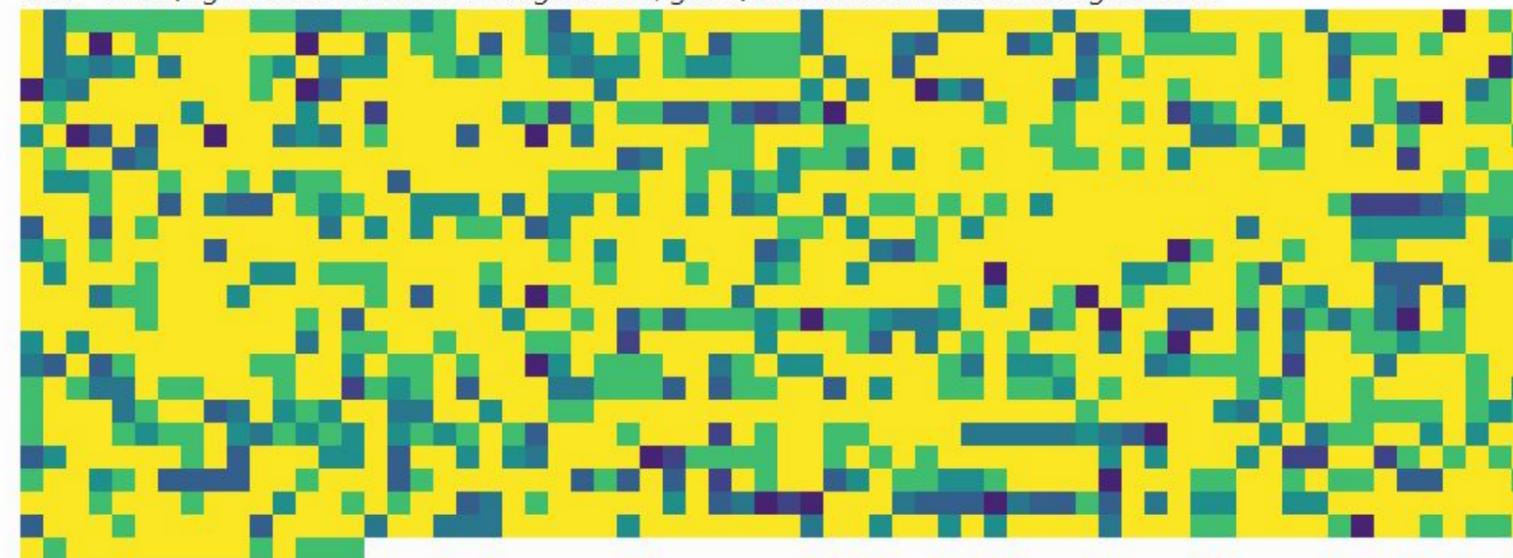
<https://jhpoelen.nl/bat-taxonomic-alignment/>

status: Agreement Index values calculation done.

Figure 1. BTA Agreement Index using Viridis scale. Yellow/light colors indicate more agreement, green/dark shades indicate less agreement.

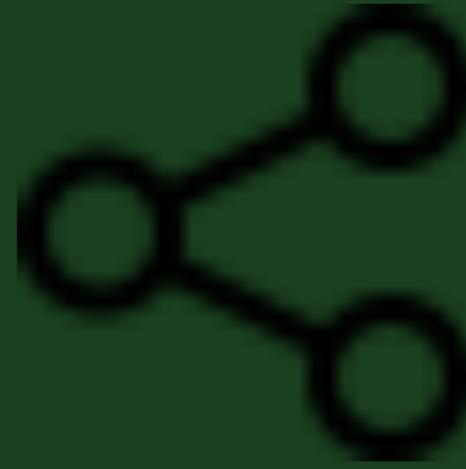


Figure 2. A clickable heatmap containing all BTA concepts and their associated agreement index organized in no particular order. Yellow/light colors indicate more agreement, green/dark shades indicate less agreement.



Future Goals

Reverse engineering
More authorities
Citation extraction
Subspecies and Synonyms
Full bibliography
Stabilize data
Relational databases
Exhaustive name list



Acknowledgements

