

CURRICULUM VITAE  
**Nathan Steadman Upham, Ph.D.**  
April 2023

Arizona State University  
School of Life Sciences, Tempe Campus  
Tempe, AZ 85287, USA

Tel: 773.263.1533 (mobile)  
e: [nathan.upham@asu.edu](mailto:nathan.upham@asu.edu)  
web: <https://n8u.org>

## EDUCATION

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2014	Ph.D.	Evolutionary Biology	University of Chicago, Chicago, IL.	
2010	M.S.	Evolutionary Biology	University of Chicago.	
2008	M.A.	Biology	Occidental College, Los Angeles, CA.	(Cal Tech courses, 2007)
2006	B.A.	Biology	Occidental College.	(Univ East Anglia exchange, 2004)

## PROFESSIONAL APPOINTMENTS

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2022-present. Assistant Professor, **Arizona State University**, School of Life Sciences.  
2021-present. Senior Global Futures Scientist, [ASU Julie Ann Wrigley Global Futures Laboratory](#).  
2020-present. Research Associate, **Yale University**, Dept. of Ecology & Evolutionary Biology.  
2014-present. Research Associate, **Field Museum of Natural History**, Division of Mammals.  
2020-2022. Assistant Research Professor, **Arizona State University**, School of Life Sciences.  
2020-2022. Associate Curator of Mammals, [ASU Natural History Collections](#).  
2015-2020. Postdoctoral Associate, **Yale University**, Dept. of Ecology & Evolutionary Biology.  
- Walter Jetz lab: NSF-funded [VertLife Terrestrial](#) project, focus on mammal tree of life.  
2014-2015. Postdoctoral Fellow, **McMaster University**, Department of Biology.  
- Ben Evans, Brian Golding labs: evolution of vizcacha rats (the largest mammalian genome).  
2008-2014. Doctoral Researcher, **University of Chicago**, Committee on Evolutionary Biology.  
- Bruce Patterson lab (Field Museum): biogeography of Neotropical mammals.  
2006-2008. Curatorial Associate, **Moore Laboratory of Zoology**, Occidental College.  
- Responsible for care and maintenance of 65,000+ bird and mammal specimens.

## GRANTS AND FELLOWSHIPS

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(pending). **U.S. National Science Foundation**, “RaMP: Arizona Island Biodiversity Network (AZ iBioNet): Dryland Oases for Research Mentorship in a Rapidly Changing World” to NSF 23-514, DBI-Research and Mentoring for Postbaccalaureates in Biological Sciences (RaMP) (PI with co-PI Sharon J. Hall). Proposed: \$2,415,939 in direct costs (2024-2028), proposal #2319859.

(pending). **U.S. National Science Foundation**, “DMS/NIGMS 2: Spatial, Multi-Host Petri Net Models for Zoonotic Disease Forecasting” to NSF 22-600, Joint DMS/NIGMS Initiative to Support Research at the Interface of the Biological and Mathematical Sciences (Co-PI with PI B. Sterner and Co-PI P. Jevtic). Proposed: \$789,242 direct costs (2023-2027), proposal # 2246201.

2023. **U.S. National Science Foundation**, “Collaborative Research: Ranges: Building capacity to extend mammal specimens from western North America” to NSF 21-501, DBI-ICBR (Capacity): Biocollections (PI with Co-PI D. Rowsey, along with 20 institutions). Awarded: \$11,752 direct costs (2023-2025), award #2228395 (to digitize specimen tags and field notes in the ASU Mammals Collection).

2021. **U.S. National Institutes of Health**, “Intelligently predicting viral spillover risks from bats and other wild mammals” R21 in response to PA-19-068, Secondary Analysis of Existing Datasets for Advancing Infectious Disease Research (PI with D. Reeder; also B. Sterner, A. Sen, N. Franz, A. Varsani, and J. Rees). Awarded: \$301,232 direct costs (2021-2023), [1R21AI164268-01](#).

2018. **U.S. National Socio-Environmental Synthesis Center (SESYNC)**, Thematic Pursuit, “The death and life of biodiversity: Modeling extinction and resilience on islands” (co-PI with S. Cooke, L. Dávalos, A. Mychajliw, & A. Soto-Centeno), \$30,000 for 3 meetings.

2014. **Royal Ontario Museum**, Schad Conservation Grant, “Integrating ecological and economic tools for sustainable conservation: Mammals as indicators of ecosystem and societal health in the Dominican Republic” (co-author with B. Lim as PI), \$30,000.
2012. **Field Museum of Natural History**, Armour Graduate Fellowship, \$26,000 stipend.
2011. **U. S. National Science Foundation**, Doctoral Dissertation Improvement Grant (DDIG), “Fossils and phylogeny: investigating the timing of diversification in a diverse lineage of Neotropical rodents (Caviomorpha: Octodontoidea)” (co-PI with B. Patterson), \$15,000 (2011-2013), [DEB-1110805](#).
2005. **Norris Foundation**, Norris Scholars Undergraduate Fellowship, “Molecular phylogenetics of the dark kangaroo mouse, *Microdipodops megacephalus*,” \$3000 project, \$8000 stipend.
2004. **Howard Hughes Medical Institute**, Undergraduate Summer Fellow, \$200 project, \$4150 stipend.

## PUBLICATIONS

(pdfs [here](#); \*co-first authors, ^corresponding author)

[Google Scholar](#), h-index of 20; total of 46 peer-reviewed publications (17 as first or corresponding author)

## Peer-Reviewed Articles and Book Chapters

- In revision. \*^Stewart, T.A., Yoo, I., and \*^Upham, N.S. The coevolution of mammae number and litter size. *eLife*. Pre-print on *bioRxiv*: <https://doi.org/10.1101/2020.10.08.331983>
- In revision. **Upham, N. S.**, Esselstyn, J. A., and Jetz, W. Ecological causes of speciation and species richness in mammals. Pre-print on *bioRxiv*: <https://doi.org/10.1101/504803> (now split).
2023. Harding, C., Larsen, B. B., Otto, H. W., Potticary, A. L., Krabberger, S., Custer, J. M., Suazo, C., **Upham, N. S.**, Worobey, M., Van Doorslaer, K., & Varsani, A. Diverse DNA virus genomes identified in fecal samples of Mexican free-tailed bats (*Tadarida brasiliensis*) captured in Chiricahua Mountains of southeast Arizona (USA). *Virology*, 580, 98–111. <https://doi.org/10.1016/j.virol.2023.02.004>
2023. Michielsen, N. M., Goodman, S. M., Soarimalala, V., Geer, A. A. E. van der, Dávalos, L. M., Saville, G. I., **Upham, N.S.**, & Valente, L. The macroevolutionary impact of recent and imminent mammal extinctions on Madagascar. *Nature Communications*. <https://doi.org/10.1038/s41467-022-35215-3>. Press: Over 200 news stories, including [The Guardian](#), [IFLscience](#).
2022. Harding, C., Larsen, B.B., Gryseels, S., Otto, H.W., Suazo, C., Krabberger, S., **Upham, N.S.**, Worobey, M., Van Doorslaer, K., Varsani, A. Discovery of three cycloviruses in fecal samples of silver-haired bats samples from Arizona (USA). *Archives of Virology*. <https://doi.org/10.1007/s00705-022-05574-9>
2022. Balk M.A., Deck J., Emery K.F., Walls R.L., Reuter D., LaFrance R., Arroyo-Cabrales J., Barrett P., Blois J., Boileau A., Brenskelle L., Cannarozzi N.R., Cruz J.A., Dávalos L.M., de la Sancha N.U., Gyawali P., Hantak M.M., Hopkins S., Kohli B., King J.N., Koo M.S., Lawing A.M., Machado H., McCrane S.M., McLean B., Morgan M.E., Pilaar Birch S., Reed D., Reitz E.J., Sewnath N., **Upham N.S.**, Villaseñor A., Yohe L., Davis E.B., Guralnick R.P. 2022. A solution to the challenges of interdisciplinary aggregation and use of specimen-level trait data. *iScience*, 105101. <https://doi.org/10.1016/j.isci.2022.105101>
2022. Prado, L. R., **Upham, N.S.**, Franz, N., & Sterner, B. Extending Recognition for Taxonomic Curation Beyond the Traditional Authorities. *Biodiversity Information Science and Standards*, 6, e94252. <https://doi.org/10.3897/biss.6.94252>
2022. **Upham, N.S.**, Powell, C., Prado, L., Franz, N., and Sterner, B. Extended Taxonomic Curation: Moving beyond species lists to linking species data. *Biodiversity Information Science and Standards*, 6, e93670. <https://doi.org/10.3897/biss.6.93670>
2022. Groom, Q., Adriaens, T., Bertolino, S., Phelps, K., Poelen, J., Reeder, D., Richardson, D., Simmons, N., Trekels, M., and **Upham, N.S.** The Importance of Collecting and Archiving Data on Domestic and Cultivated Organisms. *Biodiversity Information Science and Standards*, 6, e90864. <https://doi.org/10.3897/biss.6.90864>
2022. Abraham, J., **Upham, N.S.**, Serrano, A.D., Jesmer, B. Evolutionary causes and consequences of ungulate migration. *Nature Ecology & Evolution*. <https://doi.org/10.1038/s41559-022-01749-4>. Data: [Dryad](#). Press: [News & Views](#), [NPR Phoenix \(KJZZ\)](#).

2022. Marsh, C.J., Sica, Y.V., Burgin, C.J., Dorman, W.A....[142 other authors]..., ^**Upham, N.S.**, ^Jetz, W. Expert range maps of global mammal distributions harmonised to three taxonomic authorities. *Journal of Biogeography*. <https://doi.org/10.1111/jbi.14330>
2022. Munstermann M.J., Heim N.A., McCauley D.J., Payne J.L., **Upham N.S.**, Wang S.C., Knope M.L. A global ecological signal of extinction risk in terrestrial vertebrates. *Conservation Biology*. 36:3 e13852. <https://doi.org/10.1111/cobi.13852>
2021. **Upham N.S.**, Poelen J.H., Paul D., Groom Q.J., Simmons N.B., Vanhove M.P.M., Bertolino S., Reeder D.M., Bastos-Silveira C., Sen A., Sterner B., Franz N.M., Guidoti M., Penev L., Agosti D. Liberating host-virus knowledge from biological dark data. *The Lancet Planetary Health*. [https://doi.org/10.1016/S2542-5196\(21\)00196-0](https://doi.org/10.1016/S2542-5196(21)00196-0). Press: [ASU News](#)
2021. **Upham N.S.**, Esselstyn J.A., Jetz W. Molecules and fossils tell distinct yet complementary stories of mammal diversification. *Current Biology*. <https://doi.org/10.1016/j.cub.2021.07.012>. Data: [Github](#).
2021. Greenberg D.A., Pyron R.A., Johnson L.G.W., **Upham N.S.**, Jetz W., Mooers A.Ø. Evolutionary legacies in contemporary tetrapod imperilment. *Ecology Letters*. <https://doi.org/10.1111/ele.13868>
2021. Sterner B., **Upham N.S.**, Gupta P., Powell C., Franz N. Wanted: Standards for FAIR taxonomic concept representations and relationships. *Biodiversity Information Science and Standards*. 5:e75587. <https://doi.org/10.3897/biss.5.75587>
2021. Groom Q., Adriaens T., Bertolino S., Phelps K., Poelen J., Reeder D., Richardson D., Simmons N., and **Upham N.S.** 2021. Holistic understanding of contemporary ecosystems requires integration of data on domesticated, captive and cultivated organisms. *Biodiversity Data Journal*. 9:e65371. <https://doi.org/10.3897/BDJ.9.e65371>
2021. Sen, A., Sterner, B., Franz, N., Powel, C., and **Upham, N.S.** Combining Machine Learning & Reasoning for Biodiversity Data Intelligence. *Proceedings of the AAAI Conference on Artificial Intelligence*, 35: 14911-14919. <https://ojs.aaai.org/index.php/AAAI/article/view/17750>
2021. Turvey, S.T., Duncan, C., **Upham, N.S.**, Harrison, X., Dávalos, L.M. Where the wild things were: intrinsic and extrinsic extinction predictors in the world's most depleted mammal fauna. *Proceedings of the Royal Society B: Biological Sciences*. 288: 20202905. <https://doi.org/10.1098/rspb.2020.2905>
2021. Cisse O.H., Ma L., Dekker J.P., Khil P.P., Youn J.-H., Brenchley J.M., Blair R.V., Pahar B., Chabe M., Rompay K.K.A.V., Keesler R., Sukura A., Hirsch V., Kuty G., Liu Y., Peng L., Chen J., Song J., Weissenbacher-Lang C., Xu J., **Upham N.S.**, Stajich J.E., Cuomo C.A., Cushion M.T., Kovacs J.A. Genomic insights into the host specific adaptation of the *Pneumocystis* genus and emergence of the human pathogen *Pneumocystis jirovecii*. *Communications Biology* 4: 1-14. <https://doi.org/10.1038/s42003-021-01799-7>
2021. Sterner B., Elliott S., **Upham N.S.**, Franz N.M. Bats, objectivity, and viral spillover risk. *History & Philosophy of the Life Sciences* 43:7 <https://doi.org/10.1007/s40656-021-00366-x>
2020. Alhajeri, B. H., Fourcade, Y., **Upham, N. S.**, and Alhaddad, H. A global test of Allen's rule in rodents. *Global Ecology and Biogeography*. <https://doi.org/10.1111/geb.13198>
2020. **Upham N.S.**, Agosti D., Poelen J., Penev L., Paul D., Reeder D., Simmons N.B., Csorba G., Groom Q., Dimitrova M., Miller J. Liberating Biodiversity Data From COVID-19 Lockdown: Toward a knowledge hub for mammal host-virus information. *Biodiversity Information Science and Standards* 4: e59199. <https://doi.org/10.3897/biss.4.59199>
2020. Sen A., Franz N., Sterner B., **Upham N.S.** The Automated Taxonomic Concept Reasoner. *Biodiversity Information Science and Standards*. 4:e59074. <https://doi.org/10.3897/biss.4.59074>
2020. Sterner B., **Upham N.S.**, Sen A., Franz N. Avenues into Integration: Communicating taxonomic intelligence from sender to recipient. *Biodiversity Information Science and Standards* 4: e59006. <https://doi.org/10.3897/biss.4.59006>
2020. Franz N., Sterner B., **Upham N.S.**, and Hernández K.C. Redesigning the Trading Zone between Systematics and Conservation: Insights from Malagasy mouse lemur classifications, 1982 to present. *Biodiversity Information Science and Standards* 4: e59234. <https://doi.org/10.3897/biss.4.59234>
2020. Cook, J.A., Arai, S., Armien, B., Bates, J., Carrion Bonilla, C.A., de Souza Cortez, M.B., Dunnum, J.L., Ferguson, A.W., Anwarali Khan, F.A., Paul, D.L., Reeder, D.M., Simmons, N.B., Thiers, B.M., Thompson,

- C.W., **Upham, N.S.**, Vanhove, M.P.M., Webala, P.W., Weksler, M., Yanagihara, R., Soltis, P.S. Integrating biodiversity infrastructure into pathogen discovery and mitigation of epidemic infectious diseases. *BioScience* <https://doi.org/10.1093/biosci/biaa064>. Press: [The Conversation](#).
2019. **Upham N.S.**, Esselstyn J.A., Jetz, W. Inferring the mammal tree: species-level sets of phylogenies for questions in ecology, evolution, and conservation. *PLOS Biology*. [17\(12\)](#): e3000494. [Cover art](#). Data: [Github](#), [Dryad](#). Press: [Cosmos](#), [ScienceDaily](#), [Phys.org](#), [Twitter](#).
2019. McDonough, M.M., **Upham, N.S.**, and Ferguson, A.W. Nurturing the generations: the role of the American Society of Mammalogists in supporting students and early career scientists. *Journal of Mammalogy* [100](#): [690-700](#).
2019. Maestri, R., **Upham, N.S.**, and Patterson B.D. Tracing the diversification history of a Neogene rodent invasion into South America. *Ecography* [42](#): [683-695](#).
2018. \*Burgin, C.J., \*Colella, J.P., Kahn, P.K. and ^**Upham, N.S.** How many species of mammals are there? *Journal of Mammalogy* [99](#): [1-14](#). Press: [IFLscience](#), [International Business Times](#), [Phys.org](#), [EurekAlert!](#), [Teinteresa \(Madrid\)](#).
2017. (alphabetical) \*Cooke, S.B. \*Dávalos, L.M., \*Mychajliw, A.M., \*Turvey, S.T., and \***Upham, N.S.** Anthropogenic extinction dominates Holocene declines of West Indian mammals. *Annual Review of Ecology, Evolution, and Systematics* [48](#): [301-327](#). Press: [Newsweek](#), [New Scientist](#), [LiveScience](#), [Lab Manager](#), [Phys.org](#).
2017. **Upham, N.S.** and Borroto-Páez, R. Molecular phylogeography of endangered Cuban hutias within the Caribbean radiation of capromyid rodents. *Journal of Mammalogy* [98](#): [950-963](#).
2017. **Upham, N.S.** Past and present of insular Caribbean mammals: understanding Holocene extinctions to inform modern biodiversity conservation. *Journal of Mammalogy* [98](#): [913-917](#). Special Feature, including [cover image](#) by NSU.
2017. Lim, B.K., Loureiro, L.O., **Upham, N.S.**, and Brocca, J.L. Phylogeography of Dominican Republic bats and systematic relationships in Neotropics. *Journal of Mammalogy* [98](#): [986-993](#).
2017. Evans, B.J., ^**Upham, N.S.**, Golding, G.B., Ojeda, R.A., and Ojeda, A.A. Evolution of the largest mammalian genome. *Genome Biology and Evolution* [9](#): [1711-1724](#). Press: [ScienceDaily](#), [CBC Radio](#), [The Molecular Ecologist](#), [Yale Scientific](#).
2017. Maestri, R., Monteiro, L. R., Fornel, R., **Upham, N.S.**, Patterson B.D., and Freitas, T.R.O. The ecology of a continental evolutionary radiation: Is the radiation of sigmodontine rodents adaptive? *Evolution* [71](#): [610-632](#). Press: [Evolution Digest](#).
2017. Fabre, P.-H., **Upham, N.S.**, Emmons, L.H., Justy, F., Leite, Y.L.R., Loss, A.C., Orlando, L., Tilak, M.-K., Patterson, B.D., and Douzery, E.J.P. Mitogenomic phylogeny, diversification, and biogeography of South American spiny rats. *Molecular Biology and Evolution*. [34](#): [613-633](#).
2015. **Upham, N.S.** and Patterson, B.D. Evolution of caviomorph rodents: a complete phylogeny and timetree for living genera. [Pp. 63-120](#) In: *Biology of caviomorph rodents: diversity and evolution* (A.I. Vassallo and D. Antenucci, eds.). SAREM Series A, Buenos Aires, Argentina.
2015. D'Elia, G., Teta, P., **Upham, N.S.**, Patterson, B.D., and Pardiñas, U.F.J. Description of a new soft-haired mouse, genus *Abrothrix* (Sigmodontinae), from the temperate Valdivian rainforest. *Journal of Mammalogy* [96](#): [839-853](#). Press: [Diario Austral](#).
2014. Patterson, B. D. and ^**Upham, N.S.** A newly recognized family of mammals from the Horn of Africa, the Heterocephalidae (Rodentia: Ctenohystica). *Zoological Journal of the Linnean Society* [172](#): [942-963](#). Press: [BrainScoop](#), [Field Museum Blog](#).
2014. Patterson, B. D. and ^**Upham, N.S.** A study in contrasts: two extensive Neotropical radiations. *Frontiers in Ecology and Evolution* [2](#): [44](#).
2013. **Upham, N.S.**, Ojala-Barbour, R., Brito, J., Velazco P.M., and Patterson, B.D. Transitions between Andean and Amazonian centers of endemism in the radiation of some arboreal rodents. *BMC Evolutionary Biology* [13](#): [191](#). Press: [UChicago](#).
2013. **Upham, N.S.**, and Hafner, J.C. Do nocturnal rodents in the Great Basin Desert avoid moonlight? *Journal of Mammalogy*. [94](#): [59-72](#). Press: [ScienceLife Blog](#).
2013. Light, J.E., Hafner, J.C., **Upham, N.S.**, and Reddington, E. Conservation genetics of kangaroo mice, genus *Microdipodops*. *Journal of Mammalian Evolution* [20](#): [129-146](#).



2012. **Upham, N.S.** and Patterson, B.D. Diversification and biogeography of the Neotropical caviomorph lineage Octodontoidea (Rodentia: Hystricognathi). *Molecular Phylogenetics and Evolution* **63**: 417-429.
2011. Hafner, J.C., and **Upham, N.S.** Phylogeography of the dark kangaroo mouse, *Microdipodops megacephalus*: cryptic lineages and dispersal routes in North America's Great Basin. *Journal of Biogeography* **38**: 1077-1097.
2008. Hafner, J.C., **Upham, N.S.**, Reddington, E. and Torres, C.W. Phylogeography of the pallid kangaroo mouse, *Microdipodops pallidus*: a sand-obligate endemic of the Great Basin, western North America. *Journal of Biogeography* **35**: 2102-2118.

### Invited Publications

2022. Soto-Centeno, A., **Upham, N. S.**, Mancina, C., Lim, B., and Timm, R. Obituary: Gilberto Silva Taboada (1927–2022). *Journal of Mammalogy*. <https://doi.org/10.1093/jmammal/gyac030>
2020. Burgin, C. J., Widness, J., and **Upham, N. S.** Introduction. Pp. 23-40 In: *Illustrated Checklist of the Mammals of the World* (C. J. Burgin, D. E. Wilson, R. A. Mittermeier, A. B. Rylands, T. E. Lacher, and W. Sechrest, eds.). Lynx Ediciones, Barcelona.
2017. Ceriaco, L. M. et al. and 490 signatories (incl **Upham, N. S.**) Photography-based taxonomy is inadequate, unnecessary, and potentially harmful for biological sciences. *Zootaxa*. **4196**: 435-445.
2016. Pérez, M. E., and **Upham, N. S.** [Review] Mammals of South America, Volume 2: Rodents. *Ameghiniana* **53**: 523-525.
2016. Lacher, T. E., Murphy, W. J., Rogan, J., Smith, A. T., and **Upham, N. S.** Evolution, phylogeny, ecology, and conservation of the clade Glires: Lagomorpha and Rodentia. Pp. 15-26 In: *Handbook of the Mammals of the World: Volume 6. Lagomorphs and Rodents I*. (D. E. Wilson, T.E. Lacher, Jr., and R. A. Mittermeier, eds.). Lynx Ediciones, Barcelona.

### Reports

2023. Francis, C. M., Simmons, N. B., Van Cakenberghe, V., **Upham, N. S.**, and Burgin C., on behalf of the Global Bat Taxonomy Working Group of the IUCN SSC Bat Specialist Group. On the taxonomy of *Lasiurus*. Zenodo. <https://doi.org/10.5281/zenodo.7696845>
2022. **Upham, N. S.** and Francis, C. M. on behalf of the Global Bat Taxonomy Working Group of the IUCN SSC Bat Specialist Group. *On the taxonomy of Myotis keenii and Myotis evotis*. Zenodo. <https://doi.org/10.5281/zenodo.7336341>

### Commentaries

2020. Dávalos, L. M., and **Upham, N. S.** Coronavirus was low risk until it wasn't. Climate change is the same. *Medium*, **27 Mar 2020**.
2014. **Upham, N. S.** At the edge of what we know. *The Human Geographic*, **issue 1** [online multi-media magazine, popular article on vizcacha rat fieldwork in Argentina].

### Data publications

2020. Poelen J, **Upham N. S.**, Agosti D, Ruschel T, Guidoti M, Reeder D, et al. CETAF-DiSCCo/COVID19-TAF biodiversity-related knowledge hub working group: indexed biotic interactions and review summary. Zenodo. <http://doi.org/10.5281/zenodo.3839098>
2020. Mast A.R., Paul D.L., Rios N., Krimmel E.R., Bruhn R., Shorthouse D.P., Simmons N.B., **Upham N.S.**, Soltis P. 2020. Rapid Creation of a Data Product for the World's Specimens of Horseshoe Bats and Relatives, a Known Reservoir for Coronaviruses. Zenodo. <https://doi.org/10.5281/zenodo.4047200>
2020. **Upham, N. S.** Natural history specimens collected and/or identified and deposited. [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.3858103>

### Theses

2014. **Upham, N. S.** *Ecological diversification and biogeography in the Neogene: Evolution of a major lineage of American and Caribbean rodents (Caviomorpha, Octodontoidea)*. Unpubl. Ph.D. dissertation, University of Chicago, xvi + 272 pp. [Download](#) full text. [Abstract published](#) in *Mastozoología Neotropical* **21**: 193-194.

2008. **Upham, N. S.** *Rodent activity in relation to moonlight in sandy and open habitats of the Great Basin Desert*. Unpubl. M.A. thesis, Occidental College, viii + 65 pp. [Download](#) full text.
2006. **Upham, N. S.** *Phylogeography of the dark kangaroo mouse, Microdipodops megacephalus*. Unpubl. B.A. thesis, Occidental College, 35 pp.

### Manuscripts in Preparation

- How many species of mammals are there in each country? *Journal of Mammalogy* (invited).
- Big questions and big trees. *Systematic Biology*.
- Testing for adaptively radiating clades in rodents. *Evolution*.

### HONORS AND AWARDS

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2022. **Ebbe Nielsen Challenge, Global Biodiversity Information Facility**, [2<sup>nd</sup> place award](#) for the project [GBIF LACS: GBIF Literature Abstract Classification System](#) developed with Ángel Luis Robles Fernández.
2019. **Art in Research Competition, Yale Office of the Provost**, [1<sup>st</sup> place in two categories and Overall Best Entry](#) for ‘Species-level relationships of mammals’ (Figure 1 [here](#)).
2012. **American Society of Mammalogists**, A. Brazier Howell Graduate Student Honorarium for “Diversification and biogeography of a major lineage of Neotropical rodents (Caviomorpha: Octodontoidea)” (plenary session talk).
2006. **American Society of Mammalogists**, Undergraduate Student Research Honoraria for “Phylogeography of the dark kangaroo mouse, *Microdipodops megacephalus*”.
2006. **Occidental College**, graduated *magna cum laude* in Biology.
2005. **Occidental College**, Kurata Student Award for Outstanding Senior in Biology.

### TEACHING

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#### Arizona State University

##### Instructor of record

*Applied Phylogenetics*, BIO 498/598 (Fall 2023, 20 students)  
*Evolution*, BIO 345 (Spring 2021, 170 students; Spring 2023, 270 students)  
*Undergraduate Research*, BIO 495 (Spring 2021, Fall 2021, Spring 2022, Fall 2022)  
*Diversity, Equity, and Inclusion (DEI) Inclusive Teaching* (improving the Evolution course; Summer 2021).

##### Guest lectures

*Research Areas of Evolution*, EVO 610 (Spring 2023)  
*Environmental Life Sciences Seminar*, ELS 501 (Fall 2022)  
*Mammalogy*, BIO 472 (Fall 2022)  
*Topics in Evolution*, EVO 601 (Fall 2021)  
 DEI Biocollections Summer Program (Summer 2021, 2022)

#### Yale University

*Postdoctoral Teaching Scholar*, Foundations in Biology series: Evolution & Ecology (Fall 2019)  
*Scientific Teaching Fellow*, Biological Sciences (Spring 2016)

#### McMaster University

*Biodiversity, Evolution & Humanity*, Department of Biology (Fall 2014)  
 - Primary co-instructor; lectured and designed exams for two sections of an introductory course; 700 students

#### University of Chicago

*Ecology & Evolution in the Southwest*, Department of Biological Sciences (Spring 2012)  
*Biogeography*, Department of Biological Sciences (Winter 2011)  
*Insect Ecology & Evolution*, Department of Biological Sciences (Fall 2010)  
*Mammalian Ecology*, Department of Biological Sciences (Spring 2009)

Teaching Assistant Training Course, Department of Biological Sciences (Fall 2009)

## Occidental College

Evolutionary Biology, Biology Department (Fall 2007, Fall 2005)

## MENTORING

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### ASU

#### Primary Graduate Advisor

- [Ángel Luis Robles Fernández](#) (2021-present; co-advised with Nico Franz), Evolutionary Biology PhD program. Project: Host-virus interactions and global biogeographic networks. Recipient of the 2021 Edward and Linda Birge Travel Award, School of Life Sciences; 2<sup>nd</sup> place in the [2022 GBIF Ebbe Nielsen Challenge](#).
- Gilma De Leon (2023-present), 4+1 MS in Biology program. Project: Diet and microbiome diversity of *Neotoma* woodrats in the Madrean Sky Islands.
- Damien Rivera (2023-present), 4+1 MS in Biology program. Project: Gene flow of Madrean Sky Island rodents.

#### Thesis Committees

- Michael Lund (2022-present), MS in Biology program. Project: Viral discovery in desert rodents.
- Savage Hess (2022-present), MS in Biology program. Project: “Identification of novel circular DNA viruses from coyote (*Canis latrans*) scat”.

#### Undergraduate Honors Theses

- Reilly Burton (2022-present). Project: “Usutu Envelope: In silica analysis of viral amino acids in zoonotic viral capsid proteins”
- Ally Finkbeiner (2022-present). Project: “The distribution and prevalence of viruses in the rodent species *Peromyscus maniculatus* and related implications for human health”
- Shawna Brechbill (2022-present). Project: TBA
- Tanishq Jain (2022-present). Project: “The distribution and prevalence of viruses in *Peromyscus leucopus*”

#### Undergraduate Directed Research

- Nicole Veeder (2021-2022). Project: Mammal-virus interactions in public data.
- Reane Kaur (2022).

### Non-ASU

#### Undergraduate Students

- Western Connecticut State University student (♂), systematics of rodents (2020-present).
- iNaturalist intern & Ursinus College student (♂), taxonomy research on mammals (2019).
- Yale University student (♀), biodiversity research for Mammal Diversity Database project (2018).
- Yale University student (♀), summer biodiversity research for the Map of Life project (2016).
- Loyola University student (♀; at FMNH); summer & honors research on bat phylogenetics (2012).
- Cornell University student (♀; at FMNH); summer project on rodent morphometrics (2012).
- University of Wisconsin-Madison student (♀; at FMNH); project on rodent life-history traits (2011).
- Occidental College student (♀; at MLZ); honors research on kangaroo mice phylogenetics (2006-7).

## OUTREACH

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### Tempe, AZ

- Presented mammal specimens, ASU Earth and Space Open House, School of Earth & Space Exploration (2022).

### New Haven, CT

- Science Fair judge at Worthington Hooker Middle School (2017, 2018).

### Hamilton, Canada

- Weekly tutor, Empowerment Squared program for Liberian immigrants (2014-15).
- Weekly tutor, Reading Buddies & Homework Help, Hamilton Public Library (2013-14).

### Chicago, IL

- Program Facilitator, Project Exploration’s “Brothers4Science” program for 6-8<sup>th</sup> grade boys at Ariel Community Academy (10 weeks, 2012).

- Host for “Talk to the Scientist Hour” programs, Field Museum’s Pritzker Laboratory (2012-13).
- My research on digital touch-screen, Field Museum’s DNA Discovery Center exhibit (2012-13).
- Lecturer on anatomy for Project Exploration’s Junior Paleontologists course (8-12<sup>th</sup> gr.; 2012).
- Discussed science careers with 7<sup>th</sup> grade class, Young Women’s Leadership School (2012).
- Lecturer on mammalogy for Project Exploration’s All Girls Expedition course (8-12<sup>th</sup> gr.; 2011).
- Presented specimens to 7-8<sup>th</sup> graders, Project Exploration’s Sisters4Science courses (2010-2012).
- Weekly tutoring in 8<sup>th</sup> grade geometry, Canter Middle School (2010).
- Public presentation of mammal specimens, Field Museum Member’s Nights (2009-12).

## INVITED WORKING GROUPS

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- 2020-present. Consortium of European Taxonomic Facilities-Distributed System of Scientific Collections ([CETAF-DiSSCo COVID-19 Taskforce](#)), group of biodiversity collections-oriented scientists in the US, Europe, and South America working to liberate host-virus ecological data.
- 2020-present. [Museums and Emerging Pathogens in the Americas \(MEPA\)](#), group of researchers, policy makers, and advanced students from 9 countries in Central, North, and South America.
- 2018-present. North American Rodents Landscapes Ecology & Evolution (NARLEE) Working Group, adding rodent evolution expertise to 30-person RCN of geologists, modelers, biologists.
2020. [ViralMuse Taskforce](#), group for multi-disciplinary conversation about linking natural history collections with public health efforts, especially regarding host-pathogen relationships.
2017. State of the Tree of Life (SoToL) Working Group, invited to represent Mammalia in 40-person group spanning microbes, sponges, fungi, plants, and animals (Field Museum of Natural History meeting).

## INVITED TALKS

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2022. EcoHealth Alliance, EHA Seminar Series: *Mammal-centric spillover risk modeling: species meaning and ecological context are key*
2022. Swiss Institute for Bioinformatics, SIB Literature Serves group (SIBiLS): *Developing a system to predict emerging infectious diseases*
2022. Arizona State University, Molecular and Cellular Biology Seminar Series: *Evolution of the Largest Mammalian Genome — and other tails/tales.*
2022. Museums and Pathogens in the Americas (MEPA): *Pathogen spillover from wild mammals to humans: taxonomic and ecological data curation are the key to accurate risk modeling.*
2022. University of Oslo, Natural History Museum: *Mammal species, evolution, and ecology.*
2022. Angelo State University, Department of Biology: *Ecology, pathogens, and the mammal tree of life.*
2021. Argentine Mammal Society (Jornadas Argentinas de Mastozoología), main talk for the [e-JAM.21 event](#): *Mammal species, ecology, and turnover.*
2021. McMaster University, Department of Biology: *Mammal species, ecology, and turnover.*
2021. Brazilian Mammal Society (Sociedade Brasileira de Mastozoologia), keynote for the [MOCÓ event](#): *Mammal species, ecology, and turnover.*
2021. University of Colorado at Denver, Department of Integrative Biology: *Mammal evolutionary past as a key to the ecology of present-day species.*
2021. University of Memphis, Department of Biological Sciences, Annual Graduate Student Invited Seminar (BioGSA): *Mammal evolutionary past as a key to connecting the ecological present.*
2021. Arizona State University, School of Life Sciences, New Faculty Seminar series: *Mammal evolutionary past as a key to the ecological present.*
2020. TDWG 2020 Virtual Conference. Symposium on “[Using Collections to Mitigate and Prevent Zoonotic Disease](#)”: *Liberating host-virus data from COVID-19 lockdown.*
2020. [CETAF-DiSSCo Covid-19 Taskforce](#) public event. *Biodiversity knowledge hub for Covid-19 and preventing future pandemics.* [Link](#) to YouTube-streamed talk (10 minutes).
2020. Yale University, Ruslan Medzhitov Lab. *Mammalian tree of life as an essential tool for comparative biology.*
2020. Yale University, Yale Institute for Biospheric Studies (YIBS) seminar series. *Ecological causes of uneven mammalian diversity.*



2019. Universidade de São Paulo, Departamento de Ecologia. *Ecological causes of birth and death in the mammal tree of life.*
2019. Yale-CAPEs Seminars in Biomedical Sciences, Porto Alegre, Brazil. *Mammalian tree of life as an essential tool for comparative biology.*
2019. University of Rutgers Newark, Biological Sciences. *Ecological causes of speciation and species richness in the mammal tree of life.*
2019. Western Connecticut State University, Department of Biological and Environmental Sciences. *Why are there so many rodents? And other (r)evolutionary questions.*
2019. Smithsonian Institution, National Museum of Natural History. *Uniting micro- and macro-evolution in the Mammalia tree of life.*
2019. Field Museum of Natural History, A. Watson Armour seminar series. *Ecology unites micro- and macro-evolution in the mammal tree of life.*
2019. Portland State University, Department of Biology seminar series. *Mammalian tree of life and the inverse latitudinal gradient of speciation rates.*
2019. Natural History Museum of Los Angeles County, Research & Collections seminar series. *Mammalian tree of life from ancient lineages to modern backyards.*
2019. Columbia University, E3B Department seminar series. *The ecology of species diversification in the mammal tree of life.*
2017. University of New Hampshire, College of Life Sciences and Agriculture. *Untangling the bank: Mammalian evolution across scales to understand rates & drivers of species diversification.*
2016. University of Oklahoma, Sam Noble Museum of Natural History. *Mammalian evolution across scales: Untangling rates and drivers of diversification in species, clades, and higher taxa.*
2014. Instituto Argentino de Investigaciones de Zonas Áridas (IADIZA), Mendoza-CONICET (delivered in English with Spanish slides). *Pruebas para la radiación adaptativa y limitaciones ecológicas en un linaje principal de roedores.*
2012. Universidade Federal do Espírito Santo, Departamento de Ciências Biológicas, Vitória, Brasil (delivered in English with Portuguese slides). *Diversificação molecular e morfológica de Neotropical roedor linhagem maior (Caviomorpha: Octodontoidea).*

## OTHER GRANTS

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2016. **Instrumentl**, crowdfunding grant, “The super-sized genomes of desert vizcacha rats” (PI with Ben Evans and Agustina Ojeda as co-PIs), \$978 from 12 donations.
2011. **University of Chicago**, Hinds Fund (Comm. on Evol. Biol.), “Time, species, and morphology: investigating the diversification of a diverse lineage of Neotropical rodents,” \$1000.
2010. **American Society of Mammalogists**, Grant-in-Aid of Research, “Diversification of the South American rodent superfamily Octodontoidea,” \$1290.
2009. **Field Museum of Natural History**, Pritzker Lab, “Timetree of Neotropical rodents,” \$2000.
2004. **Howard Hughes Medical Institute**, Undergraduate Research Grant, \$500 project, \$600 stipend.
2003. **Occidental College**, Academic Student Projects Research Grant, \$300 project.
- TRAVEL: **Society of Systematic Biologists**, early career travel award (2017).
- American Society of Mammalogists**, Student Travel Fellowship (2010, 2014, 2016-2018).
- Occidental College**, Graduate Student Travel Awards (2007, 2008).

## Unfunded Grant Applications

2022. **U.S. National Science Foundation**, “Collaborative Research: Mammal Species of the World Next: platform for curating taxonomic intelligence to extend biodiversity data” to NSF 21-501, DBI-ICBR (Capacity): Cyberinfrastructure (PI of 4 institutions, with D. Reeder, N. Simmons, and J. Cook). Proposed: \$688,656 direct costs (2023-2026), proposal #2240519.
2022. **U.S. National Science Foundation**, “RaMP: Arizona Island Biodiversity Network (AZ iBioNet): Dryland Oases for Research Mentorship in a Rapidly Changing World” to NSF 22-506, DBI-Research and Mentoring for Postbaccalaureates in Biological Sciences (RaMP) (PI with co-PI Sharon J. Hall). Proposed: \$2,711,984 in direct costs (2022-2025), proposal #2216714.

2021. **U.S. National Science Foundation**, “Collaborative Research: Mammal Species of the World Next: platform for curating taxonomic intelligence to extend biodiversity data” to NSF 21-502, DBI-IIBR (Innovation): Bioinformatics (PI of 4 institutions, with DeeAnn Reeder, Nancy Simmons, and Joe Cook). Proposed: \$801,373 in direct costs (2022-2024), proposal #2153589.
2021. **Group on Earth Observations**, “Cloud-based Taxonomic Intelligence for Better Mammal Species Data: Proof of Concept for Rodents in the United States, Canada, and Mexico” (Co-PI with Beckett Sterner as PI).
2020. **NSF**, Division of Biological Infrastructure. “RAPID: Generating robust estimates of viral spillover risk within bats and other mammals.” (PI with Beckett Sterner as Co-PI).
2016. **NSF**, Division of Environmental Biology: Evolutionary Genetics. “Understanding the quantum genome expansion of desert vizcacha rats”. Invited full proposal. (PI with Bruce Patterson as Co-PI).
2015. **NSF**, Division of Environmental Biology: Evolutionary Genetics. “Mechanisms and consequences of genome expansion in vizcacha rats”. Pre-proposal. (PI with Bruce Patterson as Co-PI).
2015. **National Geographic Society**, Committee for Research and Exploration. “The humongous genomes of Argentine vizcacha rats: biodiversity conservation, mechanisms, and consequences” (PI, Ben Evans Co-PI).
2015. **NSF**, Postdoctoral Fellowship in Biology FY 2015. (PI).
2014. **NSF**, Science, Engineering and Education for Sustainability Fellows. “Integrating ecological and economic tools for sustainable communities: Native species as indicators of ecosystem and societal health in Miches, Dominican Republic”. (PI with Don Melnick as Co-PI).

## FIELD, LAB, AND MUSEUM EXPERIENCE

### Field Collecting and Courses

- 2021-2023. Arizona (2.5 months): Small mammal surveys in the Santa Catalina Mountains, as well as in nearby lowland Sonoran Desert scrub.
2017. Cuba (0.5 month): Scouting and permit discussions with Cuban biologists.
2016. Colombia (0.25 month): Spotlighting small mammals, Sierra Nevada de Santa Marta.
2015. Argentina (0.5 month): Second trip to collect octodontid rodents to study the genomics of mammalian tetraploidy. Provinces of Mendoza and San Juan (Ischigualasto).
2015. Dominican Republic (0.75 month): Surveying endemic bats and small mammals (hutias, solenodon) for a project on biodiversity patterns and tourism sustainability. Provinces of La Vega, Sánchez Ramirez, Monte Plata, El Seibo, and La Altagracia.
2014. Argentina (0.5 month): Collecting octodontid rodents to study the genomics of mammalian tetraploidy. Provinces of Mendoza and San Juan (Ischigualasto).
2011. Chihuahuan and Sonoran Deserts, USA (1 month): TA for Univ Chicago’s Desert Ecology Field School.
2009. Costa Rica (1 month): Participant in an NSF Pan-American Advanced Studies Institute graduate course through the Organization for Tropical Studies. La Selva, Monteverde, Palo Verde, and Las Cruces.
2007. Yosemite and the eastern Sierra Nevada, USA (0.5 month): Teaching assistant on Occidental College’s California Environment Semester.
- 2003-06. Great Basin Desert, USA (12 trips, 3 months): Collected rodents at ~25 localities for several projects.

### Molecular Genetics Labwork

- 2012-2013. McMaster University, Ancient DNA Centre (Hamilton, Canada): Performed clean-room DNA extractions and genomic sequencing from dried tissues (museum specimens).
2012. Universidade Federal do Espírito Santo, Laboratório de Mastozoologia e Biogeografia (Vitória, Brazil): PCR and DNA sequencing of rodent specimens from Brazil.
2012. Royal Ontario Museum, Laboratory for Molecular Systematics (Toronto, Canada): DNA sequenced imported tissues of Caribbean rodents.
- 2010–2012. Field Museum of Natural History, Pritzker Laboratory for Molecular Systematics and Evolution (Chicago, USA): Resident Ph.D. student; researched the molecular phylogeny and diversification of caviomorph rodents using DNA from fresh and dried tissues.
- 2003–2007. Occidental College, Moore Laboratory of Zoology (Los Angeles, USA): Undergraduate student (8 semesters, 3 summers) and Master’s student; researched the molecular systematics and phylogeography of kangaroo mice using PCR and DNA sequencing.

## Museum Collections Work

*Argentina:* Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (Buenos Aires—2011, 2012); Museo de Ciencias Naturales de La Plata (La Plata—2011); Museo Municipal de Ciencias Naturales “Lorenzo Scaglia” (Mar del Plata—2011); Museo Paleontológico Edigio Feruglio (Trelew—2011); Instituto Argentino de Investigaciones de Zonas Áridas (Mendoza—2015)

*Brazil:* Museu de Zoologia, Univ de São Paulo (São Paulo—2012); Museu Nacional (RJ—2012)

*Canada:* Royal Ontario Museum (Toronto—2012)

*USA:* Field Museum of Natural History (Chicago—2009-2014); Florida Museum of Natural History (Gainesville—2012); Moore Laboratory of Zoology (Los Angeles—2006-2008); University of California Museum of Vertebrate Zoology (Berkeley—2012); Univ of California Museum of Paleontology (Berkeley—2012); ASU Natural History Collections (2020-present)

## PROFESSIONAL SERVICE

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### Current Positions

2016-present. *Chair*, [Biodiversity Committee](#), [American Society of Mammalogists](#).

2017-present. *Taxonomy Advisor*, [IUCN SSC Small Mammal Specialist Group](#).

2021-present. *Member*, [Global Bat Taxonomy Working Group](#) of the [IUCN SSC Bat Specialist Group](#).

### Symposia and Workshops Organized

2022. Co-organizer and speaker for the symposium “[Extended taxonomic curation: moving beyond species lists to linking species data](#)” at the TDWG 2022 Hybrid Conference; Sofia, Bulgaria and virtual.

2022. Co-organizer and speaker for the symposium “[Biodiversity and conservation of Madrean Pine-oak Sky Island mammals in the US and Mexico](#)” at the American Society of Mammalogists, 100<sup>th</sup> Meeting; Tucson, AZ.

2021. Co-organizer and speaker for the discussion section “[Leveraging AI to extend specimen networks](#),” iDigBio 5<sup>th</sup> Annual Conference.

2020. Co-organizer and moderator of discussion section “[Avenues into integration: communicating taxonomic intelligence from sender to recipient](#),” TDWG 2020 Virtual Conference.

2020. Co-organizer of discussion section “[Taxonomically intelligent biodiversity data: Taking stock of our progress and next steps to scale up implementation](#),” iDigBio 4<sup>th</sup> Annual Conference.

2019. Organizer and moderator of the discussion section “Synonyms: can we find durable solutions to name-based biodiversity data?” at the 3<sup>rd</sup> Annual Digital Data Conference (iDigBio).

2019. Co-organizer of the symposium “[Mammal diversity from GenBank to the RedList](#): Challenges and rewards of integrating museum specimens in global databases of genetics, taxonomy, and spatial biodiversity” at the American Society of Mammalogists, 99<sup>th</sup> Annual Meeting; Washington, DC.

2019. Co-organizer of the workshop “[Hackathon for the Mammal Diversity Database](#)” at the American Society of Mammalogists, 99<sup>th</sup> Annual Meeting; Washington, DC.

2015. Co-organizer of the featured symposium “The Last Remaining Caribbean Mammals: Conservation Priorities and the Historical Context of Extinctions in an Island Biodiversity Hotspot” at the American Society of Mammalogists, 95<sup>th</sup> Annual Meeting; Jacksonville, FL.

- Two, two-hour sessions including eight invited speakers from five countries.
- Talks published in a [Special Feature](#) in the *Journal of Mammalogy*.

2009. Organizing committee, *Darwin / Chicago Symposium*, University of Chicago.

### Society Memberships and Service

American Society of Mammalogists, ASM (2005-present)

- Board of Directors (elected, 2014-2017)
- Biodiversity Committee (chair, 2016-present)
- Conservation Committee (2012-present)
- Systematic Collections Committee (2011-present)

American Society of Naturalists (2013-present)

Society of Systematic Biologists, SSB (2009-2011, 2013, 2017-present)  
 American Association for the Advancement of Science, AAAS (2006-2010, 2017-2020)  
 Canadian Society for Ecology and Evolution (2014-2015)  
 European Society for Evolutionary Biology (2013)  
 Sociedad Argentina para el Estudio de los Mamíferos, SAREM (2012-2014)  
 Sociedade Brasileira de Mastozoologia, SBMz (2012-2013)  
 Society for Conservation Biology, SCB (2012)

### University Service

Arizona State University  
 STRI-ASU Collaborative Steering Committee (2022-present)

### Refereeing Service ([Publons profile](#))

Manuscript referee for *American Naturalist* (2021), *American Midland Naturalist* (2012), *Biology Letters* (2021), *BioScience* (2020, 2022), *BMC Evolutionary Biology* (2014 [x2]), *CheckList* (2017), *Conservation Biology* (2018), *Current Biology* (2021 [x2]), *Ecology & Evolution* (2020, 2021), *Ethology, Ecology & Evolution* (2014), *Evolution* (2018, 2020), *Genome Biology & Evolution* (2020), *Global Ecology & Biogeography* (2019 [x3]), *Heredity* (2020, 2021), *Historical Biology* (2017), *ISME Journal* (2020), *Journal of Biogeography* (2014, 2017 [x2]), *Journal of Mammalian Evolution* (2013), *Journal of Mammalogy* (2013, 2014 [x3], 2015, 2018, 2019 [x2], 2020 [x2], 2021), *Journal of Vertebrate Paleontology* (2016 [x2]), *Journal of Zoology* (2012), *Mammalia* (2017), *Methods in Ecology & Evolution* (2018 [x2]), *Molecular Biology & Evolution* (2020), *Molecular Phylogenetics & Evolution* (2014 [x2]), *Nature Communications* (2022), *PNAS* (2021 [x2]), *Proc of the Royal Society B* (2019, 2020 [x2]), *Organismal Diversity & Evolution* (2016), *PLoS One* (2013, 2019), *Science* (2021 [x2], 2022 [x2]), *Systematic Biology* (2020 [x2], 2021), *Vertebrate Zoology* (2022), *Zootaxa* (2012, 2015, 2017).

Grant referee for FONDECYT-Chile (2017), Society of Systematic Biologists (2020), Czech Science Foundation (2021, 2022), US-Israel Binational Science Foundation (2022).

### OTHER PROFESSIONAL SKILLS

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- Spanish and Portuguese – proficient in written and spoken language.
- Mammal live-trapping and museum specimen preparation
- Driving manual transmission and four-wheel drive vehicles
- Wilderness First Responder (since 2015, recertification valid until 2023 from NOLS)
- Martial arts – Aikido (since 2011, rank of Shodan in Birankai North America)

### REFERENCE CONTACTS

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Bruce D. Patterson ([bpatterson@fieldmuseum.org](mailto:bpatterson@fieldmuseum.org))  
 MacArthur Curator of Mammals, Integrative Research Center  
 Field Museum of Natural History  
 1400 S. Lake Shore Dr., Chicago IL 60605; tel: 312-665-7750

Nico M. Franz ([nico.franz@asu.edu](mailto:nico.franz@asu.edu))  
 Professor and Biocollections Director, School of Life Sciences  
 Arizona State University  
 734 W Alameda Drive, Tempe, AZ 85287; tel: 480-965-2036

DeeAnn M. Reeder ([dreeder@bucknell.edu](mailto:dreeder@bucknell.edu))  
 Professor of Biology  
 Bucknell University  
 One Dent Drive, Lewisburg, PA 17837; tel: 570-577-1208



Walter Jetz ([walter.jetz@yale.edu](mailto:walter.jetz@yale.edu))

Professor, Department of Ecology and Evolutionary Biology  
Yale University  
165 Prospect St., New Haven, CT 06511; tel: 203-432-7540

Ben J. Evans ([evansb@mcmaster.ca](mailto:evansb@mcmaster.ca))

Associate Professor of Biology, Department of Biology  
McMaster Univ., 1280 Main Street West, Hamilton, Ontario L8S4K1 Canada; tel: 905-525-9140 x 26973