

## Josef C Uyeda

Assistant Professor

Department of Biological Sciences

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### Education

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2012. Ph.D. Zoology. Oregon State University, Corvallis, OR.

Dissertation Title: *Connecting microevolutionary processes with macroevolutionary patterns across space and time*. Advisor: Prof. Stevan J Arnold

2006. B.A. with honors, *summa cum laude*. Willamette University, Salem, OR.

Major: Biology, Minor: Chemistry

Thesis advisors: Susan Kephart & Robert Drewes (California Acad. Of Sci.)

### Academic employment

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2017-Present. Assistant Professor, Department of Biological Sciences, Virginia Polytechnic Institute and State University, Blacksburg, VA

2012-2017. Postdoctoral Fellow, Institute for Bioinformatics and Evolutionary Studies (IBEST). University of Idaho, Moscow, ID. Supervisor: Prof. Luke J. Harmon

### Publications

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*As of July, 2022 (Google Scholar): 1,984 citations (1,554 since 2017)*

*H-index = 16, i10-index = 20*

#### Peer-Reviewed Journal Articles

<sup>G</sup>graduate mentee | <sup>U</sup>undergraduate | <sup>P</sup>postdoc mentee | <sup>GC</sup>graduate committee

\*corresponding author | <sup>S</sup>senior author

26. Porto, DS<sup>P</sup>, Dahdul, W, Lapp, H, Balhoff, J, Vision, T, Mabee, P and **JC Uyeda**<sup>S</sup>. 2022. Assessing Bayesian phylogenetic information content of morphological data using knowledge from anatomy ontologies. *Systematic Biology*, syac022. doi:10.1093/sysbio/syac022. [Impact Factor: 15.68].
25. Harmon, LJ, Pennell, MW, Henao-Diaz, LF, Rolland, J, Siple, B and **JC Uyeda**<sup>S</sup>. 2021. The causes and consequences of the ubiquitous time- scaling of all evolutionary rates. *Annual Review of Ecology, Evolution and Systematics* 52:587-1105. [Impact Factor: 13.92]
24. Wynd, BM<sup>GC</sup>, **Uyeda, JC** and S Nesbitt. 2021. Including distorted specimens in allometric studies: Linear mixed models account for deformation. *Integrative Organismal Biology* 3(1):obab017. doi:10.1093/iob/obab017. [Impact Factor: 3.33]
23. Roman-Palacios, C; Wright, A; and **JC Uyeda**<sup>S</sup>. 2021. treedata.table: A wrapper for data.table that enables fast manipulation of phylogenetic trees matched to data. *PEERJ* 9:e12450. doi: 10.7717/peerj.12450. [Impact Factor: 3.33]
22. Cloyed, CS, Grady, J, Savage, V, **Uyeda, JC** and AI Dell. 2021. The allometry of animal locomotion. *Ecology* 102(7):e03369. doi: https://doi.org/10.1002/ecy.3369. [Impact Factor: 5.55]
21. **Uyeda, JC\***, Bone, N<sup>G</sup>, McHugh, SW<sup>G</sup>, Rolland, J, and MW Pennell. 2021. How should functional relationships between metabolic rate and body temperature be measured at macroevolutionary scales? *Evolution* 75(5):1097-1105. doi: 10.1111/evo.14213. [Impact Factor: 3.75]

20. Farallo, VR, Munoz, MM, **Uyeda, JC** and DB Miles. 2020. Scaling between macro-to-microscale climatic data reveals strong phylogenetic inertia in niche evolution in plethodontid salamanders. *Evolution*, 74(5):979-991. doi: 10.1111/evo.13959. [Impact Factor: 3.75]
19. Tarasov, S<sup>P</sup>, Miko, I, Yoder, MJ and **JC Uyeda**<sup>S</sup>. 2019. PARAMO: A pipeline for reconstructing ancestral anatomies using ontologies and stochastic mapping. *Insect Systematics and Diversity*, 3(6), doi:10.1093/isd/ixz009. [Impact Factor: 4.77]
18. **Uyeda, JC\***, Zenil-Ferguson, R and MW Pennell. 2018. Rethinking phylogenetic comparative methods. *Systematic Biology* 67(6):1091-1109. doi: 10.1093/sysbio/syy031. [Impact Factor: 2019-10.41 (8<sup>th</sup> most cited article) 2020-15.69 (9<sup>th</sup> most cited article)]
17. Zanne, AE, Pearse, WD, Cornwell, WK, McGlinn, DJ, Wright, IJ and **JC Uyeda**<sup>S</sup>. 2018. Functional biogeography of angiosperms: life at the extremes. *New Phytologist* (4):1697-1709. doi: <https://doi.org/10.1111/nph.15114>. [Impact Factor: 8.512]
16. Boucher, FC, Demery, V, Conti, E, Harmon, LJ and **JC Uyeda**<sup>S</sup>. 2018. A general model for estimating macroevolutionary landscapes. *Systematic Biology*, 67(2):304-319. doi: 10.1093/sysbio/syx075. [Impact Factor: 10.27]
15. Hagey, TJ, **Uyeda, JC**, Crandell, KE, Cheney, JA, Autumn, K and LJ Harmon. 2017. Tempo and mode of performance evolution across multiple independent origins of adhesive toe pads in lizards. *Evolution*, 71(10):2344-2358. doi:10.1111/evo.13318. [Impact Factor: 3.57; **Evolution News Digest coverage: Tiatragul, S., Murali, G., and JT Stroud. doi:10.1111/evo.13338**]
14. **Uyeda, JC\***, Pennell, MW, Miller, ET, Maia, R and CT McClain. 2017. The evolution of energetic scaling across the vertebrate tree of life. *The American Naturalist*, 190(2):185-199. doi: 10.1086/692326. [Impact Factor: 2018-3.86 (7<sup>th</sup> most cited article)]
13. **Uyeda, JC\***, Harmon, LJ and CE Blank. 2016. A comprehensive study of cyanobacterial morphological and ecological evolutionary dynamics through deep geologic time preserved in the genomes of modern taxa. *PLoS ONE* 11(9): e0162539. doi:10.1371/journal.pone.0162539. [Impact Factor: 2.77]
12. **Uyeda, JC**, Caetano, DS, and MW Pennell. 2015. Statistical and conceptual challenges to the comparative analysis of principal components. *Systematic Biology*, 64(4): 677-689. doi: 10.1093/sysbio/syv019. [Impact Factor: 8.92]
11. **Uyeda, JC\***, and LJ Harmon. 2014. A novel Bayesian method for inferring and interpreting the dynamics of adaptive landscapes from phylogenetic comparative data. *Systematic Biology*, 63(6):902-918. doi: 10.1093/sysbio/syu057. [Impact Factor: 8.23]
10. Pennell, MW, Eastman, JM, Slater, GJ, Brown, JW, **Uyeda, JC**, Fitzjohn, RG, Alfaro, ME and LJ Harmon. 2014. geiger v2.0: an expanded suite of methods for fitting macroevolutionary models to phylogenetic trees. *Bioinformatics*, doi:10.1093/bioinformatics/btu181. [Impact Factor: 7.31]
9. Pennell, MW, Harmon, LJ and **JC Uyeda**<sup>S</sup>. 2014. Speciation is unlikely to drive divergence rates. *Trends in Ecology and Evolution*, 29(2):72-3. doi: 10.1016/j.tree.2013.12.010. [Impact Factor: 16.74]
8. Pennell, MW, Harmon, LJ and **JC Uyeda**<sup>S</sup>. 2013. Is there room for punctuated equilibrium in macroevolution? *Trends in Ecology and Evolution*, 29(1):23-32. doi: 10.1016/j.tree.2013.07.004. [Impact Factor: 16.20]
7. Jones, AG, Bürger, R, Arnold, SJ, Hohenlohe, PA and **JC Uyeda**. 2012. The effects of stochastic and episodic movement of the optimum on the evolution of the G-matrix and the response of the mean to selection. *Journal of Evolutionary Biology*, 25(11):2210-2231. [Impact Factor: 3.48]

6. Eddy, SL, Kiemiec-Tyburczy, KM, **Uyeda, JC** and LD Houck. 2012. The influence of sequential male courtship behaviors on courtship success and duration in a terrestrial salamander, *Plethodon shermani*. *Ethology*, 118(12):1240-1250. doi: 10.1111/eth.12031. [Impact Factor: 1.56]
5. **Uyeda, JC\***, Hansen TF, Arnold SJ and J Pienaar. 2011. The million-year wait for macroevolutionary bursts. *Proceedings of the National Academy of Sciences*, 108(38):15908-15913. doi: 10.1073/pnas.1014503108. [Impact Factor: 9.74]
4. Westphal, MF, Morey, SR, **Uyeda, JC**, and Morgan, TJ. 2011. Molecular phylogeny of the subfamily Amphistichinae (Teleostei: Embiotocidae) reveals a convergent loss of red pigmentation in two rapidly evolving lineages of sand-dwelling surfperch. *Journal of Fish Biology* 79:313-330. doi: 10.1111/j.1095-8649.2011.03011.x [Impact Factor: 1.83]
3. **Uyeda, JC\***, Arnold, SJ, Hohenlohe, PA, and LS Mead. 2009. Drift promotes speciation by sexual selection. *Evolution* 63(3):583-594. doi:10.1111/j.1558-5646.2008.00589.x. [Impact Factor: 5.66]
2. **Uyeda, JC\***, Drewes, RC, and BM Zimkus. 2007. The California Academy of Sciences Gulf of Guinea Expeditions (2001, 2006) VI. A new species of *Phrynobatrachus* from the Gulf of Guinea islands and a reanalysis of *Phrynobatrachus dispar* and *P. feae* (Anura: Phrynobatrachidae). *Proceedings of the California Academy of Sciences*, 58(18):367-385.
1. **Uyeda, JC\***, and SR Kephart. 2007. Detecting species boundaries and hybridization in *Camassia quamash* and *C. leichtlinii* (Agavaceae) using allozymes. *Systematic Botany*, 31(4):642-655.

#### **Other Publications**

- Mabee, PM, Dahdul, WM, Balhoff, JP, Lapp, H, Manda, P, **Uyeda, JC**, Vision, TJ and M Westerfield. 2018. Phenoscope: Semantic analysis of organismal traits and genes yields insights in evolutionary biology. In: *Application of Semantic Technologies in Biodiversity Science*, edited by A. Thessen. IOS Press, Berlin.
- Uyeda, JC**. 2016. Quantitative genetics of evolutionary divergence and diversification. In: *The Encyclopedia of Evolutionary Biology, 1<sup>st</sup> Edition*, edited by Richard Kliman. Academic Press.

#### **Publications in Preprint or Revision**

- Mongle, CS; Machado, FA<sup>P</sup>; Nesbitt, A; Smaers, JB; Turner, AH; Grine, FE; and **JC Uyeda<sup>S</sup>**. Developmental processes mediate alignment between the micro- and macroevolution of primate molars. *In revision at Evolution*.
- Grabowski, M; Pienaar, J; Voje, KL; Andersson, S; Fuentes Gonzalez, J; Kopperud, BT; Moen, DS; Tsuboi, M; **Uyeda, JC**; and TF Hansen. A cautionary note on "A cautionary note on the use of Ornstein Uhlenbeck models in macroevolutionary studies". *In review at Systematic Biology*.
- Liow, LH; **Uyeda, JC**; and G Hunt. Cross-disciplinary information for understanding macroevolution. *In Review at Trends in Ecology and Evolution*.
- Tarasov, S<sup>P</sup> and **JC Uyeda<sup>S</sup>**. Resolving ubiquitous model congruence in phylogenetics and its application for studying macroevolution. *BioRxiv Preprint*. doi:10.1101/2022.07.04.498736.
- McHugh, SW<sup>G</sup>; Espindola, A; White, E<sup>U</sup>; and **JC Uyeda<sup>S</sup>**. Jointly modeling species niche and phylogenetic model in a Bayesian hierarchical framework. *BioRxiv Preprint submitted 7/6/2022*.

### ***Publications in Preparation***

Machado, FA<sup>P</sup>; Mongle, CS; Slater, GJ; Penna, A; Soffin, A<sup>U</sup>; Dutra, V<sup>U</sup>; and **JC Uyeda<sup>S</sup>**.

Developmentally-defined traits have the maximal linkage between micro and macroevolution. In preparation for submission to *PNAS*.

Neupane, S<sup>P</sup>; Zanne, A; Lens, F; and **JC Uyeda<sup>S</sup>**. Modeling trait heterogeneity and inferring causal links in the evolution of hydraulic traits and growth habit in Angiosperms. In preparation for submission to *The American Naturalist*.

**JC Uyeda<sup>\*</sup>** and S Tarasov<sup>P</sup>. Traits are defined by how they evolve. In preparation for submission to *Systematic Biology*.

Porto, DS<sup>P</sup>; Tarasov, S<sup>P</sup>; Charpentier, C<sup>G</sup>; Lapp, H; Dahdul, W; Balhoff, J; Mabee, P; and **JC Uyeda<sup>S</sup>**. Rphenoscate: An R package for semantic-aware evolutionary analyses of anatomical traits. <https://github.com/uyedaj/rphenoscate>. In preparation for submission to *Methods in Ecology and Evolution*.

Bone, NJ<sup>G</sup> and **JC Uyeda<sup>S</sup>**. Effectiveness of using structured hidden Markov models for testing threshold traits. In preparation for submission to *Systematic Biology*.

Dalponti, G; Caliman, A; **Uyeda, JC**, and RD Guariento. The macroevolutionary dynamics of the body size-trophic position relationship in ray-finned fishes. In preparation for submission to *Evolution*.

White, E<sup>U</sup>, Daniel, E<sup>G</sup>; Bodensteiner, B<sup>GC</sup>; Munoz, M; and **JC Uyeda<sup>\*S</sup>**. Adaptation and constraints in endotherm and ectotherm body temperature evolution. In preparation for submission to *Evolution*.

### **Grants Awarded**

***Since 2017: 5 grants, PI(2), Co-PI (3), Senior Personnel (1)***

***Uyeda Lab portion: \$1,981,280; VT portion: \$3,035,702; Total Funding: \$18,012,699***

#### ***Grants in progress***

**2021-2026.** Senior Personnel. *HDR Institute: Imageomics: A new frontier of biological information powered by knowledge-guided machine learning*. National Science Foundation Harnessing the Data Revolution, Office of Advanced Cyberinfrastructure (NSF-OAC-2118240). Part of leadership team: Convergence Workgroup Leader for Trait-Based Biology (1 of 6 convergence leads). PI: Tanya Berger-Wolf (Ohio State U), Co-PIs: Henry Bart (Tulane), Hilmar Lapp (Duke), Charles Stewart (RPI), Anuj Karpatne (VT). Total funding: \$14,969,077; VT: \$1,340,635; Uyeda Lab: \$295,376.

**2021-2024.** Co-PI. Multifactorial drivers of evolution in co-diversifying lineages with specialized plant-pollinator interactions. NSF Systematics and Biodiversity Science, NSF-DEB-2050745. PI: Anahi Espindola (University of Maryland). Co-PIs Josef Uyeda (VT), David Tank (University of Wyoming). Total funding: \$983,127; VT/Uyeda lab: \$135,619.

**2020-2023.** Co-PI. De-mystifying the Tangled Bank: A Unified Adaptive Landscape Theory For The Emergence And Maintenance Of Life. Templeton Foundation, Natural Sciences (61866). Co-PIs: Martha Munoz (Yale University), Josef Uyeda (VT). Total Funding: \$799,641, VT/Uyeda lab: \$324,634.

**2020-2025.** PI. CAREER: Integrating causal evolutionary processes into phylogenetic comparative biology. NSF Systematics and Biodiversity Science (NSF-DEB-1972717). Sole PI: Josef Uyeda (VT). Total funding/VT/Uyeda lab: \$981,487.

**2017-2022.** PI. Collaborative Research: Enabling machine actionable semantics for comparative analyses of trait evolution. NSF Advancing Biological Infrastructure, NSF-DEB-1661516. PI: Josef Uyeda (VT); Collaborating PIs: Hilmar Lapp (Duke), Todd Vision (University of North Carolina-Chapel Hill), Paula Mabee (University of South Dakota/Batelle), Wasila Dahdul (University of South Dakota). Total funding/VT/Uyeda lab:

\$172,356 + \$105,731 subcontract from Duke U. = \$278,087.

### ***Past External Funding***

**2011.** Darwin's Legacy Workshop. Outreach Grant, Society for the Study of Evolution. Co-PI: Sarah Eddy, Josef Uyeda (Oregon State University). Total Funding: \$800.

**2010-2013.** Co-PI. Doctoral Dissertation Improvement Grant. DISSERTATION RESEARCH: Determining the effect of hybridization on the evolvability of phenotypic traits using genomic markers. National Science Foundation (NSF-DEB-1011352). PI: Stevan J. Arnold (Oregon State University), Co-PI: Josef Uyeda (OSU). Total Funding: \$14,961.

**2009.** Nordic research supplement. NSF/ Research Council of Norway (Project No. 194945/V11). Co-Sponsors Thomas .F. Hansen, Tore Schweder (University of Oslo). Total Funding: \$20,000.

**2007-2010.** NSF Predoctoral Fellowship, National Science Foundation. Total Funding: \$130,500.

### ***Past Internal Funding***

**2011.** Darwin's Legacy Workshop. Outreach Grant, Precollege Programs, Oregon State University. Co-PIs: Sarah Eddy, Josef Uyeda (Oregon State University). \$800.

**2010.** Darwin's Legacy Workshop. Outreach Grant, Precollege Programs, Oregon State University. Co-PIs: Sarah Eddy, Josef Uyeda (Oregon State University). \$1000.

**2009.** Zoology Research Fund, Oregon State University. \$500

## **Science Communication**

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### ***Invited Seminars***

**April 2022 .** *The macroevolutionary architecture of trait divergence.* University of Toronto, EEB Seminar Series. Toronto, Ontario, CAN. **Graduate student invited speaker.**

**May 2021 .** *Making sense of macroevolution: State, rate, and biological process knowledge.* University of Chicago, EVMORPH Seminar Series. Chicago, IL.

**Mar 2021 .** *Making sense of macroevolution: From single stories to many.* University of Georgia, Odum School of Ecology, Athens, GA. **Graduate Student Invited Speaker.**

**Oct 2020 .** *The measurement of macroevolutionary causes.* University of Calary, Biology Department Seminar, Calgary, Alberta, Canada.

**Oct 2020 .** *The measurement of macroevolutionary causes.* University of Hawaii-Manoa, Biology Department Seminar, Manoa, HI.

**Oct 2020 .** *The measurement of macroevolutionary causes.* Virginia State University, Biology Department Seminar, Petersburg, VA.

*April 2020.* *The measurement of macroevolutionary causes.* Center for Ecological and Evolutionary Synthesis Seminar Series, University of Oslo, Oslo, Norway. Canceled due to COVID-19.

*March 2020.* *The measurement of macroevolutionary causes.* University of Virginia, Biology Department EEBIO Seminar, Charlottesville, VA. Canceled due to COVID-19.

**March 2020.** *The measurement of macroevolutionary causes.* Behavior, Ecology, Evolution and Systematics Seminar, University of Maryland, College Park, MD.

**Feb 2020.** *The measurement of macroevolutionary causes.* Duke Population Biology Seminar, Durham, NC.

**Oct 2019 .** *The measurement of macroevolutionary causes.* **Emerging Leader Talk (1 of 2 plenary speakers).** Southeastern Population Ecology and Evolutionary Genetics Conference, Clemson, SC.

**Oct 2019 .** *The measurement of macroevolutionary causes.* American Museum of Natural History, New York, NY .

- July 2019** . *Beyond tempo and mode: Toward process-based models of macroevolutionary trait evolution*. SteveFest, Oregon State University, Corvallis, OR.
- June 2019** . *Extracting meaning from phylogenetic comparative methods: The necessity of considering process*. Evolution 2019, Providence, RI.
- Mar 2019**. *Is speciation a cause of macroevolutionary change?* Gordon Speciation Conference, Ventura, CA.
- Oct 2018** . *Macroevolutionary landscapes and phylogenetic natural history*, Department of Biology, George Washington University .
- Aug 2018**. *On the need for phylogenetic natural history*, Evolution 2018, Montpellier, France (invited poster).
- June 2018**. *On the need for phylogenetic natural history*, Mountain Lake Biological Station .
- Mar 2018**. *On the need for phylogenetic natural history*, Math Bio Seminar Series, Department of Mathematics, Virginia Tech.
- Feb 2018**. *On the need for phylogenetic natural history*, Department of Ecology and Evolution, Stony Brook University .
- Feb 2018**. *On the need for phylogenetic natural history*, Phyloseminar . Link: [https://youtu.be/uzHz5jk\\_L7w](https://youtu.be/uzHz5jk_L7w)
- Nov 2017**. *The Macroevolutionary Dynamics of Adaptive Landscapes*, Biology Department, UNC- Chapel Hill.
- Nov 2017**. *The Macroevolutionary Dynamics of Adaptive Landscapes*, Department of Biology, Duke University.
- Oct 2017** . *On the need for phylogenetic natural history*, GBCB Seminar Series, Virginia Tech.
- Oct 2017** . *The macroevolutionary dynamics of adaptive landscapes*, OWLS (Emeritus Professor Group), Blacksburg, VA.
- June 2017**. *Can ontologies help us understand trait evolution? (and vice versa?)*. Society for Systematic Biology *Trees, traits and functions: Semantics for Comparative Biology Workshop*, Evolution 2017, Portland, OR.
- June 2016**. *Analyzing 'phenomic' data on phylogenies*. Next Generation Phenomics, Tools for the Tree of Life. Portland, ME.
- Mar 2012**. *The Evolutionary Blunderbuss: Connecting micro and macroevolution*. Willamette University, Salem, OR.

#### ***Contributed Talks and Posters at Professional Conferences***

- June 2022**. *Macroevolutionary modeling of life history evolution in vertebrates*. (contributed talk). Evolution 2022, Cleveland, OH.
- June 2017**. *Tracking continuously-varying adaptive landscapes through macroevolutionary time*. (contributed talk). Evolution 2017, Portland, OR.
- June 2016**. *Using synthetic databases to construct time-calibrated phylogenies for comparative analyses*. (contributed talk). Evolution 2016, Austin, Texas.
- June 2015**. *The evolution of energetic scaling relationships across the vertebrate tree of life*. (contributed talk). Evolution 2015, Guarujá, Brazil.
- Nov 2014**. *A novel Bayesian method for identifying adaptive shifts on phylogenies*. (contributed talk). Modern Phylogenetic Comparative Methods, Seville, Spain.
- June 2014**. *Detecting billion year old rate shifts in microbial evolution*. (contributed talk, co-authors Carrine Blank, Lisa Moore and Luke Harmon). Evolution 2014, Raleigh, NC.
- Apr 2014**. *Bayesian modeling of adaptive evolution on phylogenies*. (contributed talk)

**July 2013.** Evolution 2013, Snowbird, UT. *Better interpretation of patterns of trait evolution using a novel reversible-jump method of detecting adaptive regimes from phylogenetic comparative data.* (contributed talk). EVO-WIBO, Port Townsend, WA.

**July 2012.** *A classic example of stasis? Macroevolutionary patterns of body temperature evolution in mammals.* (poster, co-authors TF Hansen, G. Bloom and J Pienaar). Evolution 2012, Ottawa, ON.

**July 2011.** *How can evolutionary process models simultaneously explain micro- and macroevolutionary patterns? And how to study big evolutionary divergence databases* (contributed talk, co-authors TF Hansen, SJ Arnold and J Pienaar). Evolution 2011, Norman, OK.

**July 2010.** Evolution 2010, Portland, OR. (contributed talk, co-authors TF Hansen, SJ Arnold and J Pienaar).

**Apr 2010.** EVO-WIBO, Port Townsend, WA. (Poster- **Top Poster Award**)

**Sept 2009.** CEES annual conference, Holmen Fjordhotell, Norway. (contributed talk)

**July 2009.** Joint Meetings of Ichthyology and Herpetology, Portland, OR. (Poster)

**June 2009.** Evolution 2009, Moscow, ID. (Poster)

**June 2008.** *Speciation by drift in female mating preferences.* (contributed talk, co-authors SJ Arnold, PA Hohenlohe and LS Mead). Evolution 2008, Minneapolis, MN.

**Apr 2008.** *Speciation by drift in female mating preferences.* EVO-WIBO, Port Townsend, WA. (contributed talk, co-authors SJ Arnold, PA Hohenlohe and LS Mead)

#### ***Mentee Talks and Posters at Professional Conferences***

<sup>G</sup>graduate mentee | <sup>P</sup>postdoc mentee | <sup>U</sup>Undergraduate mentee | <sup>GC</sup>graduate committee | \***Presenter**

**June 2022.** McHugh, SW<sup>G</sup>; Espindola A; White, E<sup>U</sup>; and **JC Uyeda.** *Phylogenetic niche modeling.* Evolution 2022, Cleveland, OH. Contributed talk.

**June 2022.** Alencar, LRV<sup>P</sup>; Dominguez-Guerrero, SF; Gade, M; Daniel, ET<sup>G</sup>; Bodensteiner, BL; **Uyeda, JC** and M Munoz. *Untangling the radiation of lizards (Pleurodonta) and the role of viviparity in driving species diversification.* Poster. Evolution 2022, Cleveland, OH.

**June 2022.** Gendreau, KL<sup>GC</sup>; Hornsby, A; **Uyeda, JC**; and J McGlothlin\*. *240 million years of adaptive evolution in squamate voltage-gated sodium channels.* Evolution 2022, Cleveland, OH. Contributed talk.

**June 2022.** Daniel, E<sup>G</sup>; White, E<sup>U</sup>, Munoz, M, Bodensteiner, BL<sup>GC</sup>, and **JC Uyeda.** *Adaptation and constraints in endotherm and ectotherm body temperature evolution.* Poster. Evolution 2022, Cleveland, OH.

**June 2022.** Howell, B<sup>G</sup>; Hagey, T; and **JC Uyeda.** *Constraint in limb length allometry across lizards.* Evolution 2022, Cleveland, OH. Poster.

**June 2022.** Howell, B<sup>G</sup>; Hagey, T; and **JC Uyeda.** *Constraint in limb length allometry across lizards.* Evolution 2022, Cleveland, OH. Poster.

**June 2022.** Bone, N<sup>G</sup> and **JC Uyeda.** *Doors and dead ends in the evolution of avian migratory behavior.* Evolution 2022, Cleveland, OH. Poster.

**June 2022.** Machado, FA<sup>P</sup>; Mongle, C; Slater, GJ; Penna, A; Soffin, A<sup>U</sup>; Dutra, V<sup>U</sup>; and **JC Uyeda.** *Constraint in limb length allometry across lizards.* Poster. Evolution 2022, Cleveland, OH.

**Jan 2021.** **JC Uyeda** and BM Wynd<sup>GC</sup>. *Absolute fitness explains evolutionary patterns at the micro and macro levels.* Society for Integrative and Comparative Biology, Online, Washington, DC. Contributed talk.

**June 2021.** Bone, N<sup>G</sup> and **JC Uyeda.** *Testing the effectiveness of structured hidden Markov models.* Virtual Evolution 2021. Contributed talk.

**June 2021.** Howell, BK<sup>\*G</sup>; Hagey, T; and **JC Uyeda.** *Identifying shifts in the evolutionary allometry of limb length across lizards.* Virtual Evolution 2021. Contributed talk.

**June 2021.** McHugh, SW<sup>\*G</sup>; Espindola, A; and **JC Uyeda.** *Phylogenetic niche modeling.* Virtual Evolution 2021. Contributed talk.

**June 2021.** Porto, DS<sup>\*P</sup>; Dahdul, W; Lapp, H; Balhoff, J; Vision, T; Mabee, P; and **JC Uyeda.** Espindola, A; and **JC Uyeda.** *Phylogenetic information content of anatomy ontologies.* Virtual Evolution 2021. Contributed talk.

**Oct 2020.** Wynd, BM<sup>\*GC</sup>; **JC Uyeda.** *Including distorted specimens in allometric studies: Linear mixed models account for deformation.* Society for Vertebrate Paleontology (Online). Contributed talk.

**July 2020** Tarasov, S<sup>\*P</sup>; Miko, I; Yoder, M; and **JC Uyeda.** *Reconstructing evolution of ancestral anatomies in Hymenoptera using the PARAMO pipeline.* International Congress of Entomology, Helsinki, Finland. Canceled due to COVID-19.

**Jan 2020.** Neupane, S<sup>\*P</sup>; Zanne, A; and **JC Uyeda.** *Modelling trait heterogeneity and inferring causal links in the evolution of vessel size in Angiosperms.* Society for Systematic Biology, Systematics in the Swamp, Gainesville, FL. Contributed talk.

**Jan 2020.** Bone, N<sup>\*P</sup> and **JC Uyeda.** *Hidden states and threshold traits: Dimensions of avian migration.* Society for Systematic Biology, Systematics in the Swamp, Gainesville, FL. Poster.

**Jan 2020.** McHugh, SW<sup>\*G</sup>; Espindola, A; and **JC Uyeda.** *Phylogenetic niche modeling.* Society for Systematic Biology, Systematics in the Swamp, Gainesville, FL. Poster.

**Jan 2020.** Hoffman, D<sup>\*GC</sup>; **JC Uyeda;** and Sterling Nesbitt. *Variable evolutionary rates in the morphology of the extinct clade Aetosauria (Reptilia: Archosauria).* Society for Integrative and Comparative Biology, Austin, TX. Contributed talk.

**Jan 2020.** Wynd, BM<sup>\*GC</sup>; **JC Uyeda;** Abdala, F; and Sterling Nesbitt. *Allometric growth and shifting diet in the large-bodied traversodontid cynodont, Exaeretodon argentinus, with implications for modeling growth in distorted specimens.* Society for Integrative and Comparative Biology, Austin, TX. Contributed talk.

**Oct 2019.** Tarasov, S<sup>\*P</sup>; Miko, I; Yoder, M; and **JC Uyeda.** *Exploring and reconstructing ancestral anatomies using ontology-informed approaches.* Biology Next, Leiden, The Netherlands.

### **Software**

**BePhyNE** Bayesian estimation of Phylogenetic Niche Evolution (contributor with author Sean McHugh, R package). <https://github.com/sean-mchugh/BePhyNE>

**Ontobayes** Ontology-aware Bayesian Phylogenetic Information Analysis of Morphological data. (contributor with author Diego Sasso Porto). <https://github.com/diegosasso/ontobayes>.

**scate-shortcourse** Phylogenetic Comparative Analysis of Integrated Anatomical Traits: A Short Course (co-author, R package). <https://github.com/phenoscape/scate-shortcourse>

**PARAMO** Phylogenetic Ancestral Reconstruction of Anatomy by Mapping Ontologies (co-author). <https://github.com/sergeitarasov/PARAMO>

**bayou** Bayesian fitting of Ornstein-Uhlenbeck models to phylogenies (author, R package), <http://cran.r-project.org/package=bayou>

**treplyr** 'dplyr' functionality for matched tree and data objects (author, R package), <http://cran.r-project.org/package=treplyr>

**treedata.table** Roman-Palacios, C; Wright, April; and Josef C Uyeda. 2021. treedata.table v0.1.1 - A Wrapper For data.table For Fast Manipulation Of Phylogenetic Trees Matched To Data (R package). ROpenSci. <https://github.com/ropensci/treedata.table>

**geiger v2.0** Investigating evolutionary radiations (contributor, R package),



<http://cran.r-project.org/package=geiger>

**Arbor** Workflow software for comparative methods (contributor),

[www.arborworkflows.com](http://www.arborworkflows.com)

### ***Working groups***

**Oct 2019** MicMac Working Group, U of British Columbia, Vancouver, BC, CAN

**Mar 2019** Long-term Trends in Evolution (Templeton Foundation), Biosphere 2, Tucson, AZ

**Dec 2017** Computable Evolutionary Phenotype Knowledge Workshop, Duke U, Durham, NC

**Feb 2016** Phenotypic Research Coordination Network, Biosphere 2, Tucson, AZ

**Aug 2015** Evolution of lifespan, Tri-CEM working group, Duke U, Durham, NC

**May 2015** Tempo and Mode of Plant Trait Evolution, NESCENT, Durham, NC

**Sept 2014** OpenTree Hackathon Tree-For-All, AVATOL working group, Ann Arbor, MI

### ***Awards and Recognition***

**2022** Outstanding Research Award, Department of Biological Sciences, Virginia Tech.

**2021** Outstanding Teaching Award, Department of Biological Sciences, Virginia Tech.

**2019** Southeastern Population Ecology and Evolutionary Genetics Conference Emerging Leader.

**2017** Faculty1000Prime Article Recommendation: Uyeda et al. 2017. 3\* Exceptional.

**2005** Young Botanist Award, Society for Systematic Botany.

### ***Mentorship***

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#### ***Current Postdoctoral researchers***

Fabio Andrade Machado, Research Scientist/Postdoctoral Fellow. 12/20-Present. (Assistant Professor, Oklahoma State University, starting 2023).

T. Mason Linscott, Postdoctoral Fellow. NSF Postdoctoral Fellowship. 5/22-Present.

Laura Rodrigues Vieira de Alencar. Postdoctoral Fellow at Yale University EEB Department, (Co-advised by M Munoz and JC Uyeda).

Katherine Corn, Postdoctoral Fellow. Starting Fall, 2022.

Orlando Schwery. Postdoctoral Fellow. Swiss Mobility Fellowship. Starting Fall, 2022.

#### ***Former Postdoctoral researchers***

Diego Sasso Porto. Postdoc: 1/2020-1/2022. Current position: Postdoctoral researcher in lab of Sergei Tarasov at the Natural History Museum of Finland, Helsinki, Finland.

Sergei Tarasov. Postdoc: 8/2018-5/2019. Current position: Curator at Natural History Museum of Finland, Helsinki, Finland.

Suman Neupane. Postdoc: 6/2018 - 7/2020. Current position: Assistant Professor, Murray State University, Murray, KY.

#### ***Current Graduate Students***

Nicholas Jordan Bone<sup>†‡</sup>. PhD Candidate, began 2019. NSF Graduate Research Fellow.

Bailey Keith Howell<sup>†</sup>. PhD student, began 2020. NSF GRFP Honorable Mention.

Elizabeth Daniel Tarimo<sup>\*</sup>. Msc Student, began 2021, transitioning to PhD in 2023.

Caleb Charpentier. PhD Student, starting Fall, 2022. NSF Graduate Research Fellow.

<sup>†</sup>*Interfaces of Global Change Graduate Research Fellow*

<sup>‡</sup>*VT College of Science Dean's Diversity Fellowship*

<sup>\*</sup>*VT Department of Biological Sciences Sendelbeck Fellowship.*

#### ***Completed Graduate Students***

Sean W McHugh. MS. 8/2019-8/2021. *Phylogenetic Niche Modeling*. Current position: PhD student at Washington University in St. Louis.

#### ***Current Undergraduates Researchers***

Samantha Pham. Fall, 2021 - Present

Colin Greear. Fall 2021-Present

Lia Fontanella. VT. Spring 2022-Present

#### ***Former Undergraduate Researchers***

Emma White (Virginia Tech) Summer 2020-Summer 2021. *Now MS Student at George Mason University.*

Vitor Dutra (Florida International University) Spring 2021-Fall 2021. *Now MS student at Florida International University.*

Kaine Lovill (Virginia Tech) Fall 2020-2022

Anna Soffin (Virginia Tech), Summer 2020-2022

Heather Connor (Virginia Tech), Spring 2019

Brian Yoon (Virginia Tech), Fall 2018-Spring 2019.

Sheng Kao (Oberlin College), Summer 2018 & 2019

#### ***Former Visiting Research Scholars***

Guilherme Dalponti, PhD candidate at Federal University of Mato Grosso do Sul, Brazil, Spring 2020-July 2020; completed PhD in 2021.

#### ***Graduate Committees***

VT Department of Biological Sciences (11 students); VT Department of Geosciences (7 students); University of Maryland Department of Entomology (1 student); Yale University, Department of Ecology and Evolutionary Biology (1 student).

Total: 20 (5 completed; 4 of whom I co-authored chapters).

### **Teaching Experience**

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#### ***Instructor of record***

**2018-Present** Instructor. Evolutionary Biology (BIOL2704). 3 Credits. Virginia Tech. *Teach every spring semester with 120-150 students per class (Total: 580 students). Virtual in 2021 and 2020. Have mentored 1 graduate TA and 2 undergraduate teaching assistants.*

**2022-Present** Instructor. Special Study: Quantitative Evolutionary Biology (BIOL2984). 1 Credit. Co-taught with Jeremy Draghi. Virginia Tech. *I developed this new 1 credit course taught concurrently with our Evolutionary Biology courses with J. Draghi that gives early biology students a tour of applications of math, statistics, and computer programming to evolutionary problems (Total: 8 students).*

**Fall 2018-Present** Instructor. SS: Macroevolution & Phylogenetics (BIOL 5984). 3 Credits. Virginia Tech. *Developed and teach this graduate course with ~10-15 students per class (Total from 2 classes = 23 students). Previously taught as a Special Study course, will develop into a full course.*

**Fall 2011** Instructor. Evolution (BIOL445/545), Oregon State University. *Taught ~70 undergraduate and 8 graduate students.*

**Summers 2011, 2012** Instructor, Principles of Biology (BIOL211), Oregon State University. *Summer session instructor of record for ~100 students per class.*

#### ***Workshops & Invited Teaching Lectures***

**2011-Present** Instructor, Evolutionary Quantitative Genetics Workshop, NESCENT, NIMBioS & Friday Harbor Labs (Workshop with SJ Arnold & J Felsenstein). *Invited instructor for yearly workshop lead by SJ. Arnold and J. Felsenstein. ~30 students per week-long workshop. Canceled in 2020, virtual in 2021 and 2022.*

**2022** Instructor, Imageomics All-Hands meeting. Ohio State University, Columbus, OH. *Co-taught with Anuj Karpatne (VT) computer scientists and biologists the fundamentals of trait evolutionary modeling (~25 attendees).*

**2018-Present** Guest lecturer (*yearly*), Working with Ecological and Evolutionary Data (BIOL5984). Instructor Dr. Kate Langwig, Virginia Tech.

**2021** Guest lecturer, The Science of COVID. Instructors Dr. I. Moore & Dr. J. Draghi. ~80 students.

**2020** Phylogenetic comparative analysis of integrated anatomical traits, SSB Workshop. SSB 2020, Gainesville, FL. *Co-organized and taught half-day workshop, 55 attendees.*

**2019** Nantucket DevelopER Workshop, UMASS Nantucket Field Station, Nantucket, MA. *One of 4 instructors at this week-long workshop, 12 attendees.*

**2019** Semantic Comparative Analysis of Trait Evolution Workshop, Providence, RI. *Co-organized and taught half-day workshop, 13 attendees.*

**2017** Workshop leader, bayou tutorial, SSB standalone meeting, Baton Rouge, LA. *Sole organizer and instructor, ~20 attendees.*

**2016** Invited Instructor, Next Generation Phenomics Tools, Portland, Maine.

**2016** Invited Guest Lecturer, Biology 102: Biology & Society, University of Idaho.

**2013-2016** Invited Guest Lecturer, Biology 489: Herpetology, University of Idaho.

**2015** Society of Systematic Biology Model Based Molecular Systematics Workshop Instructor, Guarujá, Brazil.

**2012** Invited Guest Lecturer, Biology 445: Evolution, Oregon State University.

**2009** Invited Guest Lecturer, Biology 370: Ecology, Oregon State University.

### ***Teaching Assistantships***

**2010-2011** Teaching Assistant, Biology 211, 212 & 213, Oregon State University

**2006-2007** Teaching Assistant, Biology 211, 212 & 213, Oregon State University

**2006** Teaching Assistant, Biology 352: Plant Sys & Evol, Willamette University

**2005** Teaching Assistant, Biology 355: Vertebrate Zoology, Willamette University

**2004-2005** Teaching Assistant, Biology 125: Ecology, Evol & Diversity, Willamette University

### **Professional Development Training**

**2021**, Virtual Diversity Summit. Virginia Tech.

**2021** ADVANCE Geo Bystander Training, Department of Biological Sciences, Virginia Tech.

**2020** Strategies for Responding to Harassment and Bullying: Improving Workplace Climate Workshop. Virtual Evolution Conference 2020.

**2020** Presented and attended VT Department of Biological Sciences Anti-Racist teaching group meetings (lead by Dr. L. Belden).

**2019** ADVANCE Geo Bystander Training - Evo-Ally training program. Evolution 2019. Providence, RI.

### **Professional Service**

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#### ***Editorial Boards***

**2020-Present** Associate Editor, *Systematic Biology*

#### ***Society Leadership***

**2018-2021** Society for Systematic Biology, Elected Council Member. *One of 15 councilors responsible for society leadership and organization.*

### ***Professional Society Membership***

Society of Systematic Biologists  
Society for the Study of Evolution  
Society of American Naturalists  
Society for the Advancement of Chicanos/Hispanics and Native Americans in Science

### ***Professional Outreach and Mentoring***

**2020-2022** Invited Panelist. SSI Alumni Panel. California Academy of Sciences. Virtual. *Yearly participant in NSF REU panel with current undergraduate researchers.*

**June 2022** SSE Student-Faculty Networking Lunch at Evolution 2022.

**June 2019, 2022** Undergraduate diversity mentor, Evolution 2022.

**June 2019, 2022** Safe Evolution: Evo-Ally Advocate at Evolution Conference.

**July 2021** Invited Panelist. SSI Alumni Panel. California Academy of Sciences. Virtual.

**Sept 2021** Facultea series (lead by M. Emori) discussion with students. Virginia Tech.

**June 2021.** ASN/SSE/SSB ECR<sup>2</sup> graduate student-faculty networking lunch. Online events for the Evolution meetings, 2021. Met with 4 students for 1 hr networking event and had additional 1 hr follow-up conversations with 2 of them.

**June 2021.** Lead Judge for Selection Committee of the Society of Systematic Biology's Excellence Symposium. Online Evolution Meetings.

**March 2021** Invited Panelist. Faculty Panel: GTA Training and Development Workshop. Oregon State University, Department of Integrative Biology. Virtual.

**March 2019** Mid-Atlantic Undergraduate Research Conference, Poster Judge.

**June 2018** Undergraduate Student Mentoring Breakfast, Society for Systematic Biologists Conference, Columbus, OH.

### ***Panel service***

**2021** National Science Foundation, Division of Environmental Biology.

### ***Symposium Organizer***

**June 2019.** *Beyond Tempo and Mode: Toward process-based models of macroevolutionary trait evolution.* Co-organized with Stacey Smith. Evolution 2019, Providence, RI.

**Aug 2018.** *The Macroevolutionary Dynamics of Form-Function Relationships.* Co-organized with Martha Munoz. Evolution 2018, Montpellier, France.

### ***Expert Reviewer Service***

*National Science Foundation, Science, Proceedings of the National Academy of Sciences, Biology Letters, Current Biology, PLOS Biology, Evolution, The American Naturalist, Molecular Ecology (Top reviewer 2015), Systematic Biology, Methods in Ecology and Evolution, Ecology and Evolution, Journal of Human Evolution, Journal of Evolutionary Biology, Scientific Reports, Paleobiology, Proceedings Royal Society B, Axios, FONDECYT Chile, ROpenSci Software Review, Journal of Human Heredity, Nature Ecology and Evolution, New Phytologist, Nature Communications, Integrative and Comparative Biology*

### ***Virginia Tech Departmental and University Service***

**2017-Present** EvoPhy Reading Group leader and organizer. *~15 weekly participants, meeting all semester 2017 to present.*

**2020-Present** Virginia Tech Biological Sciences Graduate Mentoring Committee. *Development and implementation of departmental policies on graduate and postdoc mentoring and review.*

**2019-Present** Virginia Tech Biological Sciences Diversity Committee

**2018-Present** Global Change Center affiliated faculty

**2021-2022** Virginia Tech Biological Sciences Executive and Promotions Committee. *Department administration, tenure, and promotion review.*

**2017-2020** Biological Sciences Research Day Committee. *Organizing and implementing departmental research conference and recruiting day for prospective graduate students.*

**2019** Search Committee, Department of Biological Sciences

### ***Previous Departmental and University Service***

**2016-2017** Postdoc mentoring program, University of Idaho

**2010-2012** Co-Founder (with S. Eddy) of BIO-GradS: Broader Impacts and Outreach by Graduate Students organization, Oregon State University.

### ***Community outreach & extension***

**June 2022** Alumni Weekend Nature Tour, Virginia Tech.

**Dec 2020** MuView with Mo Science Podcast Interview.

**March 2-5, 2015** Darwin Day Roadshow, Craigmont & Moscow, ID (~200 students, 2 schools)

**April 21, 2013** Palouse Discovery Science Center, Pullman, WA (60 students)

**October 24, 2011** “Evolution and Ecology Workshop”, Corvallis, OR (80 students, 4 teachers)

**July 22, 2011** “GEAR UP” Latino student outreach panel, Corvallis, OR (30 students)

**December 2, 2010** “Discovery Nights” -Wilson Elementary School, Corvallis, OR (50 students)

**November 10, 2010** Philomath High School presentation, Philomath, OR (30 students)

**September 20, 2010** “Darwin’s Legacy Workshop”, OSU (65 students, 7 teachers)

**July 2, 2010** Evolution Teacher workshop, OSU (14 high school teachers)

**May 18, 2010** West Albany High School visit to OSU (35 students)

**April 15, 2010** Illinois Valley High School visit to OSU (35 students)

**2010-2011** Dallas High School, (2 visits to 3 classes, ~60 students)

**March 7, 2009** Science Potpourri, OSU (20 students)

**January 22, 2009** Mountain View Elementary School, Corvallis, OR (23 students)

**Spring, 2008** Fir Grove Elementary School (30 students)

**2007-2011** Myers Elementary, Salem, OR (annual visits, 300 students)

**2007 & 2008** SMILE tours, OSU (3 tours to middle school classes)

**2007-2009** Avery House Volunteer, Corvallis, OR (3 events, 60 participants)

**2005** Earthwatch assistant (helped lead ~15 volunteers), Salem, OR

### ***Additional Diversity, Equity, and Inclusion Work***

**2017-Present** Lab recruiting. *I am grateful to have recruited an outstanding group of talented and diverse graduate students, postdocs and undergraduates to my lab. Over half of my combined current and former lab members (grads and postdocs) identify as Latinx, Black, and/or Indigenous, and over 50% have been international researchers from 5 different continents.*

**2019-Present** Virginia Tech Biological Sciences Diversity Committee. *Develop and implement departmental DEI initiatives, development of departmental documents and policies, inviting and hosting speakers, and facilitating faculty recruitment.*

**2019, 2022** Undergraduate diversity mentor at Evolution 2022 (2019: Providence, RI, 2022: Cleveland, OH).

**Oct 2020** Organized, designed, and helped staff the Virtual HBCU/MSI Summit VT Department of Biological Sciences Booth.

**June 2020** Organized and moderated VT Biological Sciences Department Town Hall on Anti-Racist Action.