Kevin Surya

Curriculum Vitae

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Department of Mathematical Sciences
Molecular Biosciences Program
Montana State University, Bozeman, MT 59717
kevinsurya@montana.edu | suryakevin.github.io | Deep Time Biology Lab

Education

2020– Ph.D. Montana State University, Statistics
2015–19 B.Sc. Montana State University, Directed Interdisciplinary Studies (biology, statistics, and earth sciences)

Appointments

2021– Graduate teaching assistant
Department of Mathematical Sciences, Montana State University

2020– Graduate student researcher
Macroevolution Lab (PI: Chris Organ, University of Reading since 2022)

2020–20 Research intern
DinoChicken Lab (PI: Dana Rashid), Montana State University

2016–19 Undergraduate research assistant
MSU Macroevolution Lab (PI: Chris Organ), Montana State University

2015–19 Undergraduate research assistant
DinoChicken Lab

2017–19 Undergraduate research assistant
Varricchio Lab (PI: David Varricchio), Montana State University

Publications

8. **Surya, K.**, and C. L. Organ. (2022). The driver of phenotypic diversity is molecular change, not time. *To be submitted to Nature.*
7. **Surya, K.**, J. D. Gardner, and C. L. Organ. (2022). Detecting punctuated evolution in SARS-CoV-2 over the first year of the pandemic. *Submitted to PLOS Biology.*
6. Sheheen, J. R., D. J. Rashid, **K. Surya**, J. B. Sanders, T. Huey, J. R. Horner, and S. C. Chapman. (2022). Nonpathological inflammation drives tail fusion in avian dinosaurs. *Submitted to Science Immunology.*
5. Fernandes-Martins, M. C., L. M. Keller, M. Munro-Ehrlich, K. R. Zimlich, M. K. Mettler, A. M. England, R. Clare, **K. Surya**, E. L. Shock, D. R. Colman, and E. S. Boyd. (2021). Ecological dichotomies arise in microbial communities due to mixing of deep hydrothermal waters and atmospheric gas in a circumneutral hot spring. *Applied and Environmental Microbiology. Link*.
4. Nemudryi, A., A. Nemudraia, T. Wiegand, **K. Surya**, M. Büyükyörük, C. Cicha, K. Vanderwood, R. Wilkinson, and B. Wiedenheft. (2020). Temporal detection and phylogenetic assessment of SARS-CoV-2 in municipal wastewater. *Cell Reports Medicine. Link*.
3. Rashid, D. J., R. Bradley, A. M. Bailleul, **K. Surya**, H. N. Woodward, P. Wu, Y-H. Wu, D. B. Menke, S. G. Minchey, B. Parrot, S. L. Bock, C. Merzdorf, E. Narotzky, N. Burke, J. R. Horner, and S. C. Chapman. (2020). Distal spinal nerve development and divergence of avian groups. *Scientific Reports. Link*.

2. Gardner*, J. D., **K. Surya***, and C. L. Organ. (2019). Early tetrapodomorph biogeography: Controlling for fossil record bias in macroevolutionary analyses. *Comptes Rendus Palevol. Preprint. Link*.
   * contributed equally to the study
1. Rashid, D. J., **K. Surya**, L. M. Chiappe, N. R. Carroll, K. L. Garrett, B. Varghese, A. Bailleul, J. K. O'Connor, S. C. Chapman, and J. R. Horner. (2018). Avian tail ontogeny, pygostyle formation, and interpretation of juvenile Mesozoic specimens. *Scientific Reports. Link*.

Grants & Awards ($41,363)

17. Montana State University (MSU) Office of Student Engagement Student Club Rolling Funding: Molecular Biosciences Program student club. 2021. $522.
16. MSU Graduate School Community-Building Mini-Grant. (2021). $500.
15. Molecular Biosciences Program Fellowship. (2020). $22,000++.
14. Society for the Study of Evolution (SSE)/BEACON Center for the Study of Evolution in Action Undergraduate Diversity at Evolution travel award. (2019). $250++.
13. MSU Undergraduate Scholars Program (USP) Research Grant: Which phylogenetic branch length unit better fits species' phenotypic traits: Time or genetic substitution? (2018–2019). $1,800.
12. MSU Office of Student Engagement Student Club Mass Funding: Dead Lizards Society, a paleontology journal club. (2018–2019). $1,726.
11. Sigma Xi Grants-In-Aid of Research Program: Which phylogeny better fits species' trait data: Time or molecular tree? (2017–2018). $1,000.
10. Geological Society of America (GSA) Rocky Mountain Section Travel Grant. (2017). $90.
9. MSU USP Research Grant: Which phylogeny better fits species' trait data: Time or molecular tree? (2017–2018). $1,800.
8. MSU College of Letters and Science Student Research Travel Grant. (2017). $375.
7. GSA On To The Future Travel Awards. (2017). $500++.
6. MSU USP Travel Grant: Paleohistology technique for sub-fossilized bone. (2017). $500.
5. Kenny Dye Memorial Scholarship. (2017–2018). $1,900.
4. Natural History Museum of Los Angeles Student Collections Study Award: Avian pygostyle fusion. (2017). $1,300.
3. Montana Academy of Sciences Student Research Grant: Chicken pygostyle fusion sheds light on ankylosing spondylitis pathology. (2017–2018). $700.
2. Montana IDeA Network of Biomedical Research Excellence (INBRE) Undergraduate Student Research Program: Chicken pygostyle fusion sheds light on ankylosing spondylitis pathology. (2017). $4,600.
1. MSU USP Research Grant: Pelvic sexual dimorphism in Palaeognathae (Aves: Neornithes) and its evolutionary relationship with relative egg size. (2016–2017). $1,800.

Teaching

Teaching Assistantships

2021– M 121 – College Algebra, MSU (x1), Eval: 4.3/5

Presentations

17. **Surya, K.**, J. D. Gardner, and C. L. Organ. (2021) SARS-CoV-2 evolution is punctuated. Molecular Biosciences 1st-Year Fellow Presentations.
16. **Surya, K.**, and W. J. Freimuth. (2019) Montana State University (MSU) ERTH101 – Earth System Sciences: Fossils and Evolution. *Guest Lecture.*
15. **Surya, K.**, and C. L. Organ. (2019) Molecular branch lengths fit trait evolution better than does time. Evolution Meeting.
14. Gardner, J. D., **K. Surya**, and C. L. Organ. (2019) Phylogeography of the tetrapod water-land transition. MSU Earth Sciences Colloquium.
13. **Surya, K.**, and C. L. Organ. (2019) Does trait evolution follow time or genetic substitution? National Conference of Undergraduate Research (NCUR).
12. **Surya, K.**, D. J. Rashid, and S. C. Chapman (2019) Chicken tail vertebral fusion sheds light on a human backbone disease. Montana Academy of Sciences Annual Meeting.
11. **Surya, K.**, D. J. Rashid, L. M. Chiappe, N. R. Carroll, K. L. Garrett, B. Varghese, A. Bailleul, J. K. O'Connor, S. C. Chapman, and J. R. Horner. (2018) Bird tail growth necessitates re-interpretation of Mesozoic bird fossils. MSU Earth Sciences Colloquium.
10. **Surya, K.**, and C. L. Organ. (2018) Which phylogeny better fits species' trait data: Time or molecular tree? MSU Student Research Celebration Topical Session: *Macroevolution: The Fellowship of the Tree.*
9. **Surya, K.**, and C. L. Organ. (2018) Which phylogeny better fits species' trait data: Time or molecular tree? NCUR.
8. **Surya, K.**, I. M. Brenes, J. D. Gardner, L. W. Viñola López, C. L. Organ, and D. J. Varricchio (2017) Pelvic coevolution with egg size and shape: Implications for extinct dinosaurs. Geological Society of America Annual Meeting.
7. Rashid, D. J., **K. Surya**, S. C. Chapman, L. M. Chiappe, A. M. Bailleul, and J. R. Horner (2017) Pygostyle development and its implications for the Cretaceous long- to short-tailed avian transition. Society of Vertebrate Paleontology Annual Meeting.
6. **Surya, K.**, D. J. Rashid, and S. C. Chapman (2017) Chicken pygostyle fusion sheds light on ankylosing spondylitis pathology. Montana IDeA Network of Biomedical Research Excellence (INBRE) Summer Research Poster Session.
5. **Surya, K.**, L. W. Viñola López, and E.-T. Lamm (2017) Paleohistology technique for sub-fossilized bone. International Symposium on Paleohistology.
4. **Surya, K.**, I. M. Brenes, L. W. Viñola López, J. D. Gardner, C. L. Organ, and D. J. Varricchio (2017) Pelvic sexual dimorphism in modern birds (Aves: Neornithes) and its evolutionary relationship with relative egg size. MSU Student Research Celebration.
3. **Surya, K.**, I. M. Brenes, L. W. Viñola López, J. D. Gardner, C. L. Organ, and D. J. Varricchio (2017) Pelvic sexual dimorphism in modern birds (Aves: Neornithes) and its evolutionary relationship with relative egg size. MSU Earth Sciences Colloquium.
2. **Surya, K.**, L. W. Viñola López, I. M. Brenes, J. D. Gardner, C. L. Organ, and D. J. Varricchio (2017) Pelvic sexual dimorphism in modern birds (Aves: Neornithes) and its evolutionary relationship with relative egg size. NCUR.
1. **Surya, K.** (2016) Assessment on the origins of avian active flight. MSU Earth Sciences Colloquium.

Professional Service

Panel Organizer

2021 Molecular Biosciences Career Panel: Primarily Undergraduate Institutions

2021 Molecular Biosciences Career Panel: NIH and Health/Bioinformatics Industries (moderator)

Service to Profession

- Peer reviewer (*n* = 4; *Biology Letters* [1], *Evolution* [1], and *Journal of Evolutionary Biology* [2])

Memberships

- Society for the Study of Evolution
- Society of Systematic Biologists
- MSU Molecular Biosciences Program Student Committee (treasurer/general student committee member 2020–2022)
- MSU Dead Lizards Society (paleontology journal club; co-president 2017–2018)
- MSU Asian Student Interracial Association (officer 2021)
- Sigma Xi (2017–2018)
- Montana Academy of Sciences (2016–2018)
- Society of Vertebrate Paleontology (2015–2019)
- Geological Society of America (2016–2018)

Volunteer & Public Outreach

2018, 19 Montana State University (MSU) Family Science Day
2018 Montana Science Olympiad
2018 Morning Star Elementary School STEM Expo
2017 Society of Vertebrate Paleontology volunteer at the Geological Society of America Annual Meeting
2017 Museum of the Rockies (MOR) Scout's Day
2016 MOR volunteer in *MSU Catapalooza*
2016 MOR volunteer in *Adventures in the Lost World*
2016–17 MOR dinosaur educational cart and fossil preparation volunteer (212.5 hours)
2015–16 Volunteer fossil preparator for L. J. Krumenacker, Ph.D

Conferences Attended

2019, 21 Evolution Meeting
2017 Geological Society of America Annual Meeting
2017 International Symposium on Paleohistology
2016, 17 Society of Vertebrate Paleontology Annual Meeting

Workshop Attended

2020 Multiscale Microbial Dynamics Modeling Summer School (online)
2018 RevBayes Demonstration and Mini Workshop by Tracy Heath

Paleontological Field Experience

2018 Excavation, Foremost Formation, north of Rudyard, MT, USA (10 days)
2016 Excavation and prospection, Two Medicine Formation, west of Choteau, MT, USA (31 days)

Skills

- Programming (R, PYTHON, REVBAYES and BASH)
- Bayesian and frequentist regression modeling (R, PYTHON, SAS, and REVBAYES)
- Nonparametric (e.g., random forests) and multivariate statistics (R and SAS)
- Phylogenetic comparative methods (BAYESTRAITS, R, and LEVOLUTION)
- Multiple sequence alignment and editing (ALIVIEW, JALVIEW, MUSCLE, MAFFT, PAGAN, TRIMAL)
- Phylogenetic inference and divergence time estimation (MESQUITE, RAPIDNJ, SDM, PHYD*, TREEPL, LSD2, FASTTREE, PHYML, RAXML, IQ-TREE, MRBAYES, BEAST1, and BEAST2)
- Selection inference (HYPHY/DATAMONKEY)
- Biostatistics (R)
- Cloud computing (Amazon Web Services)
- Histochemistry (picrosirius red, alcian blue, modified tetrachrome, von Kossa, Giemsa, hematoxylin, eosin, and toluidine blue stainings)
- Immunohistochemistry (tuj1, TUNEL assay, and sambucus nigra stainings)
- Light and fluorescence microscopy
- Bone demineralization with a cation exchange resin
- Dissection (embryonic and post-hatching birds)
- Paleontology field work (excavation and prospection)
- Paleontology techniques (fossil preparation, molding, and casting)
- Paleohistology techniques
- Mathematics (MATHEMATICA)

References

1. **Chris Organ**
   Department of Earth Sciences
   Montana State University, Bozeman, MT 59717
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2. **John Borkowski**
   Department of Mathematical Sciences
   Montana State University, Bozeman, MT 59717
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3. **Matt Lavin**
   Plant Sciences & Plant Pathology Department
   Montana State University, Bozeman, MT 59717
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4. **Dana Rashid**
   Department of Microbiology and Immunology
   Montana State University, Bozeman, MT 59717
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5. **Blake Wiedenheft**
   Department of Microbiology and Immunology
   Montana State University, Bozeman, MT 59717
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6. **David Varricchio**
   Department of Earth Sciences

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