# Janani Ravi

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## Education

| | | |
|---|---|---|
| 2011 | **Ph.D. Genetics, Bioinformatics and Computational Biology** <br> Dissertation: Mathematical modeling of pathways involved in cell cycle regulation and cell differentiation | **Virginia Tech** <br> Blacksburg, VA |
| 2006 | **B.Tech. Industrial Biotechnology** <br> Centre for Biotechnology | **Anna University** <br> Chennai, India |

## Work Experience

| | | |
|---|---|---|
| 2021– | **Assistant Professor** (Fixed-Term) <br> Pathobiology and Diagnostic Investigation | **Michigan State University** <br> East Lansing, MI |
| 2018–2020 | **Senior Research Associate** <br> Pathobiology and Diagnostic Investigation | **Michigan State University** <br> East Lansing, MI |
| 2013–2017 | **Postdoctoral Research Associate** <br> Public Health Research Institute | **Rutgers University** <br> Newark, NJ |
| Feb–Mar'17 | **Visiting Scientist** <br> National Center for Biotechnology Information | **National Institutes of Health** <br> Bethesda, MD |
| Jan–Feb'15 | **Visiting Scientist** <br> Center for Cell Circuits | **Broad Institute** <br> Boston, MA |
| 2012–2013 | **Postdoctoral Research Associate** <br> Dept. of Mathematics | **Rutgers University** <br> Piscataway, NJ |
| 2006–2011 | **Graduate Research Assistant** <br> Dept. of Biology | **Virginia Tech** <br> Blacksburg, VA |
| 2005–2006 | **Student Researcher** <br> Bioinformatics Centre | **Indian Institute of Science** <br> Bangalore, India |

## Research Keywords

Computational biology/bioinformatics | molecular evolution and phylogeny | comparative pathogenomics | drug repurposing | genomics/transcriptomics | infectious diseases | R for biological data science

## Publications

[*Contributed equally] [ºCorresponding author]

[*JRaviLab current/past members, underlined*]

Publications: jravilab.github.io/publication/ | Software and Data: jravilab.org, github.com/jravilab

*In preparation*

- Severin GB, Hsueh BY, Elg CA, Dover JA, Rhoades CR, Wessel AJ, Top EM, **Ravi J**, Parent KN, and Waters CM. Novel Cytidine Deaminase-based Antiphage System in Bacteria. [in preparation]
- Lensmire JM, Wischer M, Ensink E, Dodson J, Shook J, Sosinski LM, Lunt S, **Ravi J**, Hammer ND. *Staphylococcus aureus* nutrient sulfur acquisition targets host-derived glutathione and promotes interspecies competition. [in preparation for *PLoS Pathogens*]
- **Ravi J***, Kaufman G*, Rey-Jurado E, Mehra S, Nikolaev EZ, Kaushal D, Sontag ED, Pine R, Tyagi S, Gennaro ML. Single-cell analysis of genes involved in lipid droplet accumulation in *Mycobacterium tuberculosis*-infected macrophages. [in preparation for *Journal of Lipid Research*]

*Preprints and Manuscripts submitted/under revision*
- **Ravi J**✲ᴳ, Fioravanti A✲ᴳ. S-layers: the proteinaceous multifunctional armours of Gram-positive pathogens. [invited review for *Frontiers in Microbiology, Special Issue on "Cell Surface Proteins of Gram-positive Pathogenic Bacteria"*]
- Chen SZ✲, Sosinski LM✲, Johnston JB, **Ravi J**ᴳ. MolEvolvR: A web-app for characterizing proteins using molecular evolution and phylogeny. [submitted to *Nucleic Acids Research*] [Webapp]
- Samart K✲, Tuyishime P✲, Krishnan Aᴳ, **Ravi J**ᴳ. Reconciling multiple connectivity scores for drug repurposing. 2020 [arXiv] [Live doc] [GitHub] [under revision at *Briefings in Bioinformatics*]
- **Ravi J**ᴳ, Anantharaman V, Chen SZ, Datta, P, Aravind Lᴳ, Gennaro MLᴳ. Phage-shock-protein (Psp) Envelope Stress Response: Evolutionary History & Discovery of Novel Players. 2020. [bioRxiv] [Webapp] [in preparation for *Molecular Biology and Evolution*]
- **Ravi J**ᴳ, Tyson JJᴳ. Modeling the START transition in the budding yeast cell cycle. [submitted] [Webapp]
- Thorne C, **Ravi J**, Tyson JJ, Lee E. Feedback among components of the β-catenin destruction complex imparts discrete signal transduction and memory. [submitted]

*Published papers*
- Hadi SA, Kolte IV, Brenner EP, Cunha EAT, Simonsen V, Ferrazoli L, Villela DAM, Santos RS, **Ravi J**, Sreevatsan S, Basta PC. Identification of a predominant genotype of Mycobacterium tuberculosis in Brazilian indigenous population. *Scientific Reports.* 2021 Jan 13;11(1):1224. PMID: 33441660.
- Lensmire JM, Dodson JP, Hsueh BY, Wischer MR, Delekta PC, Shook JC, Ottosen EN, Kies PJ, **Ravi J**, Hammer ND. The Staphylococcus aureus cystine transporters, TcyABC and TcyP, facilitate nutrient sulfur acquisition during infection. *Infection and Immunity.* 2019 Dec; epub. PMID: 31843961.
- **Ravi J**, Anantharaman V, Aravind L, Gennaro ML. Variations on a theme: Evolution of the phage-shock-protein system in Actinobacteria. *Antonie Van Leeuwenhoek*. 2018 May;111(5):753-760. PMID: 29488183. [GitHub]
- Chauhan R, **Ravi J**, Datta P, Chen T, Schnappinger D, Bassler K, Balázsi G, Gennaro ML. (2016) Reconstruction and topological characterization of the sigma factor regulatory network of Mycobacterium tuberculosis. *Nature communications.* 7:11062. PMID: 27029515. [GitHub]
- Datta P, **Ravi J**, Guerrini V, Chauhan R, Hancioglu B, Igoshin O, Neiditch M, Gennaro ML. (2015) The Psp system of *Mycobacterium tuberculosis* integrates envelope stress sensing and envelope preserving functions. *Molecular Microbiology*. 97: 408-422. PMID: 25899163. [GitHub]
- Salamon H, Bruiners N, Lakehal K, Shi L, **Ravi J**, Yamaguchi KD, Pine R, Gennaro ML. (2014) Cutting Edge: Vitamin D regulates lipid metabolism in *Mycobacterium tuberculosis* infection. *Journal of Immunology* 193: 30-34. PMID: 24899504.

## Grants, Awards

### Research Funding
- 2021–2022 Spectrum Health and MSU from the Alliance (PI: Jeremy Prokop, Nicholas Hartog)
- 2021 NSF-funded BEACON (PI)
- 2020–2021 NIH R01 Sub-award for summer support. (PI: Neal Hammer)
- 2019 Diversity Research Network, Launch Awards Program, Michigan State University (PI)
- 2019–2021 Harvey J Fiege Endowed Research Fund, College of Veterinary Medicine, MSU (PI)
- 2017 ORAU/ORISE Visiting Scientist Program at NCBI, NIH.
- 2015 Broad Institute Visiting Scientist Program at the Center for Cell Circuits.
- 2007 P.E.O. International Peace Scholarship for Graduate Research.
- *Also, see Team Member Accomplishments section below.*

**Conference**

- 2018, 2020 ISMB: Conference registration grant award.
- 2017 ASM Tuberculosis: Travel grant award.

**Teaching, Education, and Outreach**

- All-University Excellence in Diversity Award, Michigan State University (for R-Ladies East Lansing).
- MSU Data Science Learning Community funded by the MSU Academic Advancement Network.
- Sponsorships for 15+ R-Ladies East Lansing meetups.
- Sponsorship for Women+ Data Science East Lansing @MSU symposia (2019, 2020).

## Teaching/Workshops, Oral Presentations, Posters

*Workshop & talks*: [jravilab.github.io/talk](jravilab.github.io/talk) | *\*Upcoming*; *⧧Invited*; *ᵛVirtual*; *#cancelled due to COVID-19*.

**Teaching, Workshops**

- 2021-04   ⧧*Using Tidyverse for Genomics. R-Ladies Tunis (Africa) and R-Ladies Bangalore (India).
- 2020-09   ⧧Methods in phylogeny, pangenomes, genomics. *Integrated Microbial Biology, MSU, MI*
- 2020-05   ⧧#Session on Data Visualization. *DANG! symposium, Univ of Michigan, MI*
- 2020-02   ⧧Molecular Evolution and Phylogeny. *Chemistry and Biology of Pathogens, MSU, MI*
- 2019-09   ⧧Best Practices for Computational Sciences: R for Reproducible Research. *Diversity Research Network Researcher's Workshop, MSU, MI*
- 2019-03   R for Genomics Workshop. *Indian Institute of Technology, Madras, India*
- 2019/20   ⧧Tidyverse Workshop for Genomics. *R for Plant Genomics course, MSU, MI*
- 2018/19   Introduction to Tidy Data with R Workshop. *R-Ladies East Lansing, MI*
- 2018/19   Introduction to Data Visualization with R Workshop. *R-Ladies East Lansing, MI*

**Co-organized Meetings**

- 2020–   Women+ Data Science webinar series and panel discussionsᵛ
- 2020-04   #Women+ Data Science Symposium at MSU, *East Lansing, MI*
- 2020-08   Conference on Computational Health. *Grand Rapids, MI*
- 2019-04   Women in Data Science Symposium *East Lansing*, @MSU
- 2018–   R-Ladies East Lansing workshops, meetups, and discussions, *MI*

**Talks**

- 2020-11   *⧧Michigan Precollege & Youth Outreach Conferenceᵛ
- 2020-08   BEACON Congressᵛ
- 2020-07   Intelligent Systems for Molecular Biology, International Society for Computational Biologyᵛ
- 2019-09   ⧧R for you! Diversity Research Network, MSU Inclusion. *MI*
- 2019-08   Conference on Computational Health. *Grand Rapids, MI* | Also chaired one of the sessions.
- 2019-07   Gram-positive bacteria and bacilli meeting. *College Park, MD*
- 2019-05   ⧧Chemistry and Biology of Pathogens. MSU, *MI*
- 2019-01   ⧧Simple rules to make an effective scientific presentation. *CMIB seminar series,* MSU, *MI*
- 2018-07   ISMB 2018, *Chicago, IL*
- 2016-06   ASM Microbe 2016, *Boston, MA*
- 2014-10   ⧧Institute for Mathematical Sciences, *Chennai, India*

**Posters**

- 2019-05   ASBMB Symposium on Evolution and Core Processes in Gene Expression. *Michigan State University, MI* | Also, chaired one of the sessions.
- 2017-07   ASM Tuberculosis, *New York, NY*
- 2015-11   Lipid Research Symposium at the Rutgers Center for Lipid Research, *Rutgers University, NJ*

- 2011-03    Computational Cell Biology Meeting. *Cold Spring Harbor Laboratories, NY*
- 2010-11    Signal Transduction and Gene Regulatory Networks Workshop. *Mathematical Biosciences Institute, OSU, OH*
- 2009-07    Gordon Research Conference on Cell Growth and Proliferation. *Colby College, ME*
- 2009-03    Computational Cell Biology Meeting. *Cold Spring Harbor Laboratories, NY*
- 2009-02    Biological Sciences Research Symposium. *Virginia Tech, VA*

### Other Scientific Meetings

- 2014-09    Computational Genomics workshop. *Center for Cell Circuits, Broad Institute, MA*
- 2013-09    Biomarkers for Tuberculosis: New Questions, New Tools. *Chantilly, VA*
- 2010-05    The Cell Cycle Meeting. *Cold Spring Harbor Laboratories, NY*
- 2007-06    Joint meeting of the National Centers of Integrative and Systems Biology 2007. *Boston, MA*
- 2007-06    Summer Symposium on Systems Biology of Cancer. *Koch Institute for Integrative Cancer Research. MIT, MA*
- 2007-04    ASBMB Meeting. *Washington DC*

## Professional Memberships, Services, Education, and Outreach

### Scientific Societies

2018 –           Member, International Society for Computational Biology; EvolCompGen COSI committee
2015 –           Member, American Society of Microbiology
2014 – 2015   Member, Postdoc Association, New York Academy of Sciences

### University/Academic Services

2020 –           Grant Reviewer, Diversity Research Network, MSU
2019 –           Grant Reviewer, Endowed Research Funds, College of Veterinary Medicine, MSU
2019 – 2020   Member, CMSE Undergraduate Data Science Curriculum Committee

### Conference committees

2020 –           Program and Content Chair, useR! 2021 (the global R conference)
2020 –           Abstract Area Chair, EvolCompGen, ISMB 2021
2018 –           Intelligent Systems for Molecular Biology, EvolCompGen COSI committee
                 *flagship conference of International Society for Computational Biology*
2019 – 2020   Poster Awards Chair, EvolCompGen, ISMB 2020

### Education and Outreach

2019 –           Co-founder and Co-organizer, MSU Data Science Learning Community
                 Co-founder and Co-organizer, Women+ Data Science initiative with MSU, UMich
2019 –           Member, Data Carpentry | Genomics and Open Science Education teams
2018 –           Member, R-Ladies Global; Women in Data Science; rOpenSci
2018 –           Founder and Co-organizer, R-Ladies East Lansing
                 *\* 500+ members; 1 national symposium; 2 K-12 events; 25+ workshops; $10K+ funding*
2006 – 2011   Member and Co-organizer, Asha for Education, Virginia Tech

## Mentoring

### Team Members (Current & Past)

*Undergraduate Researchers (2019 – Present)*
*[Student initials referenced in the 'accomplishments' section below]*

- Samuel Chen, SC          Computer Science Engineering, MSU; Honors College
- Karn Jongnarangsin, KJ    Human Biology (completed); Data Science; CSE, MSU
- Philip Calhoun, PC        Human Biology, MSU; Drew Scholar; Honors College
- Kewalin Samart, KS        Computational Mathematics; CMSE, MSU; Scholarship from BIOTEC, Thailand
- Elliot Majlessi, EM       Biochemistry & Biotechnology, MSU
- Mary Zhang, MZ           Biology, Carleton College, MN
- Larissa Ford, LF          Biochemistry & Biotechnology; CMSE, MSU
- Lauryn Brooks, LB         Microbiology, Hampton University, VA

*Alumni*
- Lauren Sosinski, LS       Biochemistry & Biotechnology; Genomics & Molecular Genetics; CMSE, MSU
- Phoebe Tuyishime, PT      Nutritional Sciences; Global Public Health & Epidemiology, MSU; Mastercard Foundation Scholar; Justin S. Morrill Leadership Fellow

## Team Member Accomplishments

- *Undergraduate publications*
  - **SC & LS** (molecular evolution and phylogeny)
    [1] Chen SZ, Sosinski LM, Johnston JB, *Ravi J*. MolEvolvR: A web-app to characterize proteins using molecular evolution and phylogeny. [*submitted to NAR*.] [Webapp]
    [2] Lensmire JM, Wischer M, Ensink E, Dodson J, Shook J, Sosinski LM, Lunt S, *Ravi J*, Hammer ND. *Staphylococcus aureus* nutrient sulfur acquisition targets host-derived glutathione and promotes interspecies competition. [*in preparation for PLoS Pathogens.*]
    [3] *Ravi J*, Anantharaman V, Chen SZ, Datta, P, Aravind L, Gennaro ML. Phage-shock-protein (Psp) Envelope Stress Response: Evolutionary History & Discovery of Novel Players. 2020 [bioRxiv] [Webapp]
  - **KS & PT** (drug repurposing)
    [4] Samart K*, Tuyishime P*, Krishnan A, *Ravi J*. Reconciling multiple connectivity scores for drug repurposing. 2020. [arXiv] [Live doc] [GitHub] [*under revision at Briefings in Bioinformatics.*]
- *Funding/Scholarships*
  - **KJ & SC**  2020: REU/ACRES (NSF-funded) Summer scholarship.
  - **PC**       2020: BRUSH/NIH Summer scholarship; 2019: SROP Summer and BEACON fellowships.
  - **KS**       2020: College of Natural Science scholarship for Spring, Summer, Fall.
  - **LB**       2020: NSURP BIPOC Summer research program for microbiology, 2020.
  - **PT**       2019: Contributed to now funded DRN Launch Awards Program grant proposal.
- *Student posters/talks*
  [$^V$Virtual; *received honorary mention for their posters; $^\#$cancelled due to COVID-19]
  - **EM, PC**. [TALKS] 2020: Phi Zeta Research Symposium$^V$
  - **SC, KJ**. [TALKS] 2020: Talks at BEACON Congress$^V$
  - **PC**. 2020: National Veterinary Scholars Symposium, AAVMC$^V$
  - **SC, KJ, KS, PC, EM, LS**. Mid-Michigan Symposium for Undergraduate Research Experience$^V$
  - **SC*, KJ*, PT, PC**. 2020: ISMB (International Society for Computational Biology conference)$^V$
  - **SC, PT, KJ, PC, LS**. 2020$^\#$: Women+ Data Science at MSU, *East Lansing, MI*
  - **PC**. 2019: Phi Zeta Research Symposium, College of Veterinary Medicine, Michigan State University; Mid-Michigan Symposium for Undergraduate Research Experiences, *East Lansing, MI*
  - **LS**. 2019: Women in Data Science Symposium East Lansing @ Michigan State University; University Undergraduate Research and Arts Forum (UURAF), *East Lansing, MI*
- *Career next steps*
  - **PT**: Mastercard Foundation Scholarship for Masters in Public Health, University of British Columbia, Canada. Also accepted to fully-funded PhD programs at Purdue University, Emory University, UC Davis.
  - **LS**: Post-baccalaureate program with Biochemistry, Michigan State University.