

# NITIN PHADNIS

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## RESEARCH INTERESTS

Speciation; selfish genetic elements; molecular arms races.

## EDUCATION AND TRAINING

2008-2013 **Postdoctoral fellow** (Basic Science); Advisor: Harmit S. Malik  
Fred Hutchinson Cancer Research Center, Seattle, WA.

2002-2008 **Ph.D.** (Biology); Advisors: H. Allen Orr and James D. Fry  
University of Rochester, Rochester, NY.

1997-2000 **B.Sc.** (Microbiology)  
University of Pune, India.

## PROFESSIONAL APPOINTMENTS

2013-present **Assistant Professor**, Department of Biology, University of Utah.

## HONORS

2019 Faculty Fostering Undergraduate Research Award, University of Utah.

2019 Faculty Recognition Award, University of Utah.

2016 Pew Biomedical Scholar, *Class of 2016*.

2014 *Finalist*, March of Dimes Basil O' Connor Award.

2014 *Finalist*, NIH Director's New Innovator Award.

2013 Mario R. Capecchi Endowed Chair in Biology, University of Utah.

2009 Howard Hughes Medical Institute fellow of the Life Sciences Research Foundation (LSRF).

2009 Harold M. Weintraub Award, an international award for outstanding achievements during graduate studies.

2009 Outstanding Dissertation Award in the Natural Sciences, University of Rochester, Rochester, NY.

2009 *Finalist*, Larry Sandler Memorial Award for the most outstanding dissertation in *Drosophila* research; Genetics Society of America.

## PUBLICATIONS (\*new since 4<sup>th</sup>-year formal review)

2019\* Cooper, J.C., Leonard, C.J., Pederson, B., Carey, C., Quinlan, A., Elde, N.C., & **Phadnis, N.** Endless conflicts: Detecting molecular arms races in mammalian genomes. *bioRxiv* 685321.

2019\* Fuller, Z.L., Koury, S.A., Leonard, C.J., Young, R.E., Ikegami, K., Westlake, J., Richards, S., Schaeffer, S.W., & **Phadnis, N.** Extensive recombination suppression and chromosome-wide differentiation of a segregation distorter in *Drosophila*. *bioRxiv* 504126, to be submitted to *Genetics*.

2019\* Cooper, J.C., Guo, P., Bladen, J., & **Phadnis, N.** A triple-hybrid cross reveals a new hybrid incompatibility locus between *D. melanogaster* and *D. sechellia*. *bioRxiv* 590588; submitted to *Genetics*.

- 2019\* King, T.D, Leonard, C.J., Cooper, J.C., Nguyen, S, Joyce, E.F., & **Phadnis, N.** Recurrent losses and parallel evolution of the condensin II complex. *bioRxiv* 120758; *Molecular Biology and Evolution*, in press.
- 2019\* Cooper J. C., A. Lukacs, S. Reich, T. Schauer, A. Imhof, & **N. Phadnis.** Altered chromatin localization of hybrid lethality proteins in *Drosophila*. *Molecular Biology and Evolution*, in press.
- 2018\* Fuller Z. L., C. J. Leonard, R. E. Young, S. W. Schaeffer, & **N. Phadnis.** Ancestral polymorphisms explain the role of chromosomal inversions in speciation. *PLOS Genetics* 14: e1007526
- 2017\* Cooper, J.C. & **Phadnis, N.** Parallel evolution of sperm hyper-activation Ca<sup>2+</sup> channels. *Genome Biology and Evolution* doi:10.1093/gbe/evx131
- 2015 **Phadnis, N.**, Baker, E.P., Cooper, J.C., Frizzell, K., Hseih, E., de la Cruz, A.F., Shendure, J, Kitzman, J., & Malik, H.S. An essential cell cycle regulation gene causes hybrid inviability in *Drosophila*. *Science*, 350: 1552-1555.
- 2015 Lee, J.E., Oney, M., Frizzell, K., **Phadnis, N.**, & Hollien, J. *Drosophila melanogaster* activating transcription factor 4 regulates glycolysis during endoplasmic reticulum stress. *G3 (Bethesda)*. 13;5(4):667-75.
- 2012 **Phadnis, N.**, Hsieh, E. & Malik, H.S. Birth, death and replacement of karyopherins in *Drosophila*. *Molecular Biology and Evolution* 29(5):1429-40
- 2011 **Phadnis, N.** Genetic architecture of male sterility and segregation distortion in *Drosophila pseudoobscura* Bogota-USA hybrids. *Genetics* 189 (3):1001-1009.
- 2009 Oliver, P.L., Goodstadt L, Bayes JJ, Birtle, Z., Roach KC, **Phadnis, N**, Beatson SA, Lunter, G, Malik, H.S., & Ponting, C.P. Accelerated evolution of the Prdm9 speciation gene across diverse metazoan taxa. *PLoS Genetics*, Dec; 5(12):e1000753.
- 2009 **Phadnis, N.** & Orr, H.A. A single gene causes both male sterility and segregation distortion in *Drosophila* hybrids. *Science*, 323: 376-378.
- 2005 **Phadnis, N.** & Fry, J.D. Widespread correlations between dominance and homozygous effects of mutations: Implications for theories of dominance. *Genetics* 171: 385-392.
- 2004 Fry, J.D., Bahnck, C.M., Mikucki, M., **Phadnis, N.**, & W.C. Slattery. Dietary ethanol mediates selection on aldehyde dehydrogenase activity in *Drosophila melanogaster*. *Integrative and Comparative Biology* 44:275-283.
- 2000 Watve, M., Shejval, V., Sonawane, C., Rahalkar, M., Matapurkar, A., Shouche, Y., Patole, M., **Phadnis, N.**, Champhenkar, A., Damle, K., Karandikar, S., Khirsagar, V. & Jog, M. The 'K' selected oligophilic bacteria: a key to uncultured diversity? *Current Science* 78:1535-1542.

## REVIEWS, PERSPECTIVES, AND BOOK CHAPTERS (\*new since 4<sup>th</sup>-year formal review)

- 2018\* Fuller, Z.L., Koury, S.A., **Phadnis, N.**, & Schaeffer, S.W. How chromosomal rearrangements shape adaptation and speciation: Case studies in *Drosophila pseudoobscura* and its sister species *D. persimilis*. *Molecular Ecology*, 28: 1283-1301.
- 2017\* **Phadnis, N.** Poisons, antidotes and selfish genes. *Science*, 356:1013.
- 2016\* Cooper, J.C. & **Phadnis, N.** A genomic approach to identify hybrid incompatibility genes. *Fly*, 26:1-7.
- 2014 **Phadnis, N.** and Malik, H.S. Speciation via autoimmunity *Cell* 159(6):1247-9.
- 2013 **Phadnis, N.** and Malik, H.S. The molecular and evolutionary basis of hybrid sterility: from *Odysseus* to *Overdrive*. Book chapter, 'Speciation: Natural Processes, Genetics and Biodiversity'. Nova Publishers.
- 2007 Orr, H.A., Masly, J.P and **Phadnis, N.** Speciation in *Drosophila*: from genes to molecules. *Journal of Heredity* 98(2): 103-110

## FUNDING

### Current

- 2016-2020 Pew Biomedical Scholars Program.  
P.I. (\$75,000/ year for four years).
- 2015-2020 National Institutes of Health [1 R01 GM 115914].  
The molecular basis of speciation in *Drosophila*.  
P.I. (\$294,275/ year for five years).

### Past

- 2013-2016 Mario Capecchi Endowed Chair in Biology.  
P.I. (\$40,000/ year for four years).

### Pending

- 2020-2025 R35 NIH, MIRA.  
The molecular mechanisms of selfish genes and speciation  
P.I. (requested: \$450,000 direct costs/ year for five years).
- 2020-2023 Keck Foundation; Phase I proposal.  
Battles within our genomes: uncovering the mechanisms of selfish chromosomes  
P.I. (requested: \$1,000,000 over three years).

## TRAINEES

### Graduate students

- 2019- Thomas D. King (B.S., Bowdoin College), MCEB Biology student.
- 2019- Chelsea Gosney (B.S. Lawrence University), MCEB Biology student, co-mentored with Dr. Sophie Caron.
- 2018- Shelley Reich (B.S., M.S.), MCEB Biology student.
- 2018- Sarah Gross (B.S., Bennington College, VT), MCEB Biology student.

- 2013-2019 Jacob Cooper, Ph.D. 2019 (B.S., CU Boulder), MB Program student, funded by NIH T32 Developmental Biology Training Grant. Current: Research Scientist, Recursion Pharma, Salt Lake City, UT.
- 2014-2018 Chris J. Leonard, M.S. 2018 (B.S., University of Utah). Current: Scientist, Tempus, Inc, Chicago, IL.

### **Postdoctoral fellows**

- 2016- Dr. James Baldwin-Brown (Ph.D., University of California, Irvine), co-mentored with Dr. Michael Shapiro.
- 2017- Dr. Spencer Koury (Ph.D., Stony Brook University)
- 2013-2014 Dr. Kimberly Frizzell (Ph.D., University of Utah). Current: Scientist, ARUP Laboratories, Salt Lake City, UT.

### **Research Technicians**

- 2018- Josue Seoane (B.S., University of Utah)
- 2017-2018 Chris Large (B.S. University of Puget Sound). Current: PhD student, U. of Washington
- 2013-2016 Rande Young (B.S., Louisiana State University). Current: Ph.D. student, U.C. San Diego.

### **Undergraduate researchers**

#### *Current*

Amanda Jones  
 Aubrey Hawks  
 Zach Bowser  
 Jackson Bladen  
 Amanda Jones  
 Michelle White

### **High school students**

Frances Willberg; currently BS, Bioengineering student at U. of Arizona.  
 Maria Reyes; 3/16-current.

#### *Alumni*

Alyssa Black Undergraduate Researcher, now PhD student at UVA, Charlottesville.  
 Josiana Goodman Undergraduate Researcher, now DDS student, University of Utah.  
 Alysha Scheeler Undergraduate Researcher, now pursuing degree in health promotion, Indiana University.  
 Alexander Shu Undergraduate Researcher, now BS student, Bioengineering, U. of Utah.  
 Frances Willberg High School student, now BS student, Bioengineering at U. of Arizona.  
 Lane Mulvey Undergraduate Researcher.  
 Steph Van Beuge Undergraduate Researcher, now PhD student at University of Oregon.  
 Ping Guo Research technician, University of Utah.  
 Evin Padhi Undergraduate Researcher, now PhD student at University of Missouri.

### **Graduate Supervisory Committee member for:**

1. Andre Kurlov (Advisor: Richard Clark)
2. Scott Villa (Advisors: Dale Clayton, Sarah Bush)
3. Rebecca Bruders (Advisor: Mike Shapiro)
4. Katelyn Froehlich (Advisor: Markus Babst)
5. Justin Panich (Advisor: Kelly Hughes)

6. William Morrison (Advisor: Julie Hollien)
7. Benjamin Hardisty (Advisor: Fred Adler)
8. Thomas Carter (Advisor: Cedric Feshotte)
9. Anna Vickrey (Advisor: Mike Shapiro)
10. Clay Carey (Advisor: Nels Elde)
11. Kaitlyn Ellis (Advisor: Sophie Caron)
12. Hunter Hill (Advisor: Kent Golic)

### ROTATION STUDENTS

David Almanzar (MCEB Program, 2016)  
 Nora Brown (Molecular Biology Program, 2015)  
 Lincoln Gay (MCEB Program, 2015)  
 Samantha Hill (Math-Bio Program, 2015)  
 Tommy Carter (Molecular Biology Program, 2014)  
 Deeptha Vasudevan (Molecular Biology Program, 2014)  
 Rufino Rodriguez (Molecular Biology Program, 2014)  
 Chris Leonard (Molecular Biology Program, 2014)  
 Clayton Carey (Molecular Biology Program, 2013)  
 Rodrigo Costa (Molecular Biology Program, 2013)  
 Rachel Cosby (Molecular Biology Program, 2013)  
 Jacob Cooper (Molecular Biology Program, 2013)

### UNDERGRADUATE RESEARCH SPONSOR

1. Matthew Aspinwall (Lim Lab)
2. Nikita Abraham (Kohan Lab)
3. Liam Du Preez (Weyrich Lab)
4. Austin Gottschalk (McLennan Lab)
5. Austin Gamblin (McLennan Lab)
6. Alec Van Detta (Schleigel Lab)
6. Elika Fanaeian (Dept. of Pharmacology)
7. Levi Walker (Elde Lab)

### INVITED TALKS

2019 Systems Biology, Harvard Medical School, MA.  
 2019 University of North Carolina, NC.  
 2018 Duke University, Department of Biology, NC.  
 2018 Harvard University, OEB, MA.  
 2018 Laurentian University, ON, Canada.  
 2018 Memorial Sloan Kettering Institute, NY.  
 2018 Utah State University, UT.  
 2017 Biology of Genomes, Cold Spring Harbor Laboratories.  
 2017 University of Montana, Missoula, MT.  
 2017 **Plenary speaker:** Annual Drosophila Research Conference, San Diego.  
 2016 Chromosome Pairing Meeting, Harvard Medical School, MA.  
 2016 University of Chicago, Chicago, IL.  
 2016 **Plenary speaker:** Northwestern University, Developmental Biology Retreat.  
 2016 **Keynote speaker:** University of Rochester, Biology Retreat.  
 2016 Indian Institute of Science Education and Research, Pune, India.  
 2016 Molecular and Developmental Biology of Drosophila, Crete, Greece.  
 2016 Dept. of Biology, Johns Hopkins University, MD.

- 2016 University of Wisconsin, Madison, WI.
- 2015 University of Arizona, Tucson.
- 2015 University of California, Davis.
- 2015 Tokyo Metropolitan University, Tokyo, Japan.
- 2015 **Plenary speaker:** Establishing Next Generation Genetics, Nara, Japan.
- 2015 Dept. of Integrative Biology, University of California, Berkeley.
- 2015 Dept. of Molecular Biosciences, University of Kansas, KS.
- 2014 National Center for Biological Sciences, Bangalore, India.
- 2014 Department of Biochemistry RIP, University of Utah, UT.
- 2013 Biosciences Symposium, University of Utah, UT.
- 2013 Fred Hutchinson Cancer Research Center, Seattle, WA.
- 2011 Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, CA.
- 2010 **Student invited seminar:** Department of Biology, Indiana University, Bloomington, IN.
- 2008 Department of Molecular Biology and Genetics, Cornell University, Ithaca NY.

*Upcoming invited talks:*

- 2019 Department of Biology, University of Oregon.
- 2019 Biological Sciences, UMass Amherst, MA.
- 2019 Quantitative and Systems Biology, University of California, Merced.
- 2019 Integrative Biology, University of California, Berkeley.

**CONTRIBUTED TALKS**

- 2019 Drosophila Heterochromatin Meeting, Spoleto, Italy.
- 2017 Drosophila Heterochromatin Meeting, Cagliari, Italy.
- 2017 Pew Scholars Meeting, Santa Barbara, CA.
- 2016 Genetics Interest Group, University of Utah.
- 2015 Chromosome Pairing Meeting, Harvard University, MA.
- 2015 Department of Biology Retreat, University of Utah.
- 2014 55<sup>th</sup> Annual Drosophila Research Conference, San Diego, CA.
- 2014 Molecular Evolutionary Genetics Retreat, University of Utah.
- 2014 Society for Molecular Biology and Evolution Meeting, Puerto Rico.
- 2009 Society for Molecular Biology and Evolution Meeting, Iowa City, IA.
- 2009 50<sup>th</sup> Annual Drosophila Research Conference, Chicago, IL.
- 2008 49<sup>th</sup> Annual Drosophila Research Conference, San Diego, CA.
- 2007 Society for Molecular Biology and Evolution, Halifax, Canada.
- 2007 48<sup>th</sup> Annual Drosophila Research Conference, Philadelphia, PA, USA.
- 2004 Annual Meeting for the Society for the Study of Evolution, Fort Collins, CO.
- 2004 Eighth Eastern Great Lakes Molecular Evolution Meeting, Cornell University, Ithaca, NY.

**OUTREACH**

- 2019 INSPIRE Program, Salt Lake County Women's Jail.
- 2018 National Advisory Committee, University of Utah.
- 2018 "Modern Science" lecture, Molecular Biology Program, University of Utah.
- 2017 Featured on Verve, a public television web series on Creativity:  
<http://video.kued.org/video/2365808554>
- 2014 Molecular Biology/ Biochemistry Program Students Retreat, Zermatt, UT.