

Yashraj Chavhan

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Peer-reviewed publications

7. **Chavhan, Y.**, Malusare, S., and Dey, S. (2023). Population size shapes trade-off dilution and adaptation to a marginal niche unconstrained by sympatric habitual conditions
Evolution (Accepted article; advance access) doi.org/10.1093/evolut/qpad212
Contribution: Conceptualized the original idea and designed the project; conducted experiments and data analyses; wrote the manuscript (first and revised drafts).
6. **Chavhan, Y.***, Dey, S., and Lind, P. A.* (2023). Bacteria evolve macroscopic multicellularity by the genetic assimilation of phenotypically plastic cell clustering
Nature Communications 14, 3555 doi.org/10.1038/s41467-023-39320-9
*Corresponding author
Contribution: Made the key discovery; independently conceived the original idea and designed the project; acquired funding; conducted experiments and analyses; wrote the manuscript (first and revised drafts).
5. **Chavhan, Y.**, Malusare, S., and Dey, S. (2021). Interplay of population size and environmental fluctuations: A new explanation for fitness cost rarity in asexuals
Ecology Letters 24, 1943–1954 doi.org/10.1111/ele.13831
Contribution: Conceptualized the original idea and designed the project; conducted experiments and data analyses; wrote the manuscript (first and revised drafts).
4. **Chavhan, Y.**, Malusare, S., and Dey, S. (2020). Larger bacterial populations evolve heavier fitness trade-offs and undergo greater ecological specialization
Heredity 124, 726–736 doi.org/10.1038/s41437-020-0308-x
Contribution: Conceived the original idea and designed the project; conducted experiments and data analyses; wrote the manuscript (first and revised drafts).
3. **Chavhan, Y.**, Karve, S., and Dey, S. (2019). Adapting in larger numbers can increase the vulnerability of *Escherichia coli* populations to environmental changes
Evolution 73, 836–846 doi.org/10.1111/evo.13700
Contribution: Conceptualized the original idea and designed the project; conducted experiments and data analyses; wrote the manuscript (first and revised drafts).
2. **Chavhan, Y.**, Ali, S.I., and Dey, S. (2019). Larger numbers can impede adaptation in asexual populations despite entailing greater genetic variation
Evolutionary Biology 46, 1–13 doi.org/10.1007/s11692-018-9467-6
Contribution: Came up with the original idea and designed the study; conducted experiments, simulations, and data analyses; wrote the manuscript (first and revised drafts).
1. Karve, S.M., Daniel, S., **Chavhan, Y.**, Anand, A., Kharola, S.S., and Dey, S. (2015). *Escherichia coli* populations in unpredictably fluctuating environments evolve to face novel stresses through enhanced efflux activity
Journal of Evolutionary Biology 28, 1131–1143 doi.org/10.1111/jeb.12640
Contribution: Conducted a part of the experiments.

PhD thesis

The Effects of Population Size on Adaptation and Trade-offs: Insights from Experimental Evolution with *Escherichia coli* and Individual-based Models

(Defended: Sep 06, 2019 (IISER Pune; advisor: Prof. Sutirth Dey))

Previous academic positions

A. Independent Postdoctoral Fellow, Department of Molecular Biology, Umeå University, Sweden
(Competitively acquired my own postdoctoral funding; July 2021 - June 2023; advisor: Dr. Peter A. Lind)

B. Postdoctoral Research Associate, IISER Pune (September 2019 - June 2021; advisor: Prof. Sutirth Dey)

Academic grants and fellowships

- Wenner-Gren Fellowship for Foreign Postdoctoral Fellows (Independent postdoctoral fellowship awarded by the Wenner-Gren Foundations, Sweden; SEK 6,66,000 without taxes; July 2021 - June 2023)
- Grant from Stiftelsen Riksförbundet Cystisk Fibros Forskningsfond (Swedish Cystic Fibrosis Association Research Foundation): SEK 65,000 (2021 - 2022; co-applicant with Dr. Peter Lind)
- Grant from Magnus Bergvall's Foundation, Sweden: SEK 60,000 (2022 - 2023; co-applicant with Dr. Peter Lind)
- Grant from Insamlingsstiftelsen för medicinsk forskning vid Umeå Universitet (Fundraising foundation for Medical Research at Umeå University): SEK 59,000 per year (2022 - 2024; co-applicant with Dr. Peter Lind)
- Grant for the Development of Intellectual Property awarded by the Innovation Office at Umeå University: SEK 20,000 (2023; co-applicant with Dr. Peter Lind)
- Senior Research Fellowship (awarded by the Council for Scientific and Industrial Research, Government of India (April 2017 - January 2019))
- Senior Research Fellowship (funded by the Ministry of Human Resource Development, Government of India (August 2015 - March 2017))
- Junior Research Fellowship (funded by the Ministry of Human Resource Development, Government of India (August 2013 - July 2015))

Talks, conference presentations, awards, and workshops

- Invited Talk (October 2022): Bacteria evolve macroscopic multicellularity via the canalization of phenotypically plastic cell clustering
[National Centre for Biological Sciences, Tata Institute of Fundamental Research, Bengaluru (India)]
- Talk (August 2022): *De novo* evolution of multicellularity via the canalisation of phenotypically plastic cell clumping
[ESEB 2022: Congress of the European Society for Evolutionary Biology (Prague)]

Talks, conference presentations, awards, and workshops (continued)

- Talk (August 2022): Combining mutation bias with fitness effects to predict the genotypic and phenotypic trajectories of antibiotic resistance evolution
[Society for Molecular Biology and Evolution (SMBE) Everywhere: Global Symposium 3: Mutational Biases and Adaptation (Online)]
- Talk (December 2019): An interplay of population size and environmental stability explains why fitness costs are expected but rarely detected
[The Indo-Swiss meeting on Evolutionary Biology (Centre for Human Genetics, Bengaluru)]
- Poster (August 2018): Periodic bottlenecks can impede adaptation to selection environments and maladaptation to novel ones despite entailing greater variation
[The Second Joint Congress on Evolutionary Biology (Montpellier)]
- International Travel Award (August 2018): From the Society for the Study of Evolution, United States of America
- Workshop (January 2016): The Second Bangalore School on Population Genetics and Evolution organised by the International Centre for Theoretical Sciences in Bengaluru
- Won Mimamsa (2010 edition), one of the most prestigious nationwide interdisciplinary science competitions for undergraduates (January 2010)
[<http://archive.indianexpress.com/news/ibb-team-wins-science-quiz/575971/>]

Teaching

- Teacher: HT22 and HT23 at Umeå University (undergraduate course in basic microbiology and molecular biology (Fall 2022 and Fall 2023))
- Teaching assistant: BIO201 at IISER Pune (undergraduate course in ecology and evolution (2 semesters (Fall 2013 and Fall 2014)))
- Teaching assistant: BIO422 at IISER Pune (undergraduate course on advanced evolutionary biology (Spring 2018; module: phenotypic plasticity))
- Teaching assistant: Biostatistics: a user's perspective (public course at IISER Pune; February 2019 - July 2019)

Mentorship

- Master's thesis project at Umeå University (Student: Axel Karlsson): Characterizing mutation bias in ciprofloxacin resistance in *Pseudomonas aeruginosa*
[January 2023 – May 2023 (in conjunction with Dr. Peter Lind)]
- Semester Project at Umeå University (Student: Solenn Soullignac): The effects of population size on the evolution of tobramycin resistance in *Pseudomonas aeruginosa*
[April 2022 – June 2022 (in conjunction with Dr. Peter Lind)]
- Master's thesis project at IISER Pune (Student: Sarthak Malusare): The effects of population size and environmental composition on the utilization of an unaccustomed niche [August 2018 – April 2019 (in conjunction with Prof. Sutirth Dey)]

- Semester projects at IISER Pune: Mentored six different undergraduate research students pursuing semester projects in evolutionary biology at IISER Pune [August 2015 – December 2019 (in conjunction with Prof. Sutirth Dey)]

Record in competitive examinations

- Graduate Aptitude Test in Engineering (GATE) - Life Sciences (February 2012), conducted by the Indian Institutes of Technology: Qualified amongst the top 5% candidates in India
- Selected for the 2007 batch comprising top 27 candidates at the Institute of Bioinformatics and Biotechnology (IBB), University of Pune (July 2007)

Peer review

Peer reviewer for *Genome Biology and Evolution*, published by Oxford University Press.

Pre-doctoral research

- Research assistant (September 2012 - July 2013): How does bacterial evolvability change after evolution in randomly fluctuating environments? (Advisor: Prof. Sutirth Dey, IISER Pune)
- M.Sc. Thesis Project (August 2011 - July 2012): The effects of neutral genetic variation on the dynamics of bacterial response to novel environments (advisor: Prof. Sutirth Dey, IISER Pune)
- August 2010 - July 2011: Evolution of evolvability in randomly fluctuating environments (advisor: Prof. Sutirth Dey, IISER Pune)
- May 2010 - July 2010: Strategies in a co-evolutionary arms race between a benign brood parasite and its host (advisor: Dr. Suhel Quader, National Centre for Biological Sciences, Bengaluru)

Educational record

Date	Degree/School examination	Institute/School	Score
September 2019	Doctor of Philosophy in Evolutionary Biology	Indian Institute of Science Education and Research (IISER) Pune	CGPA (coursework): 9/10
May 2012	Integrated M.Sc. in Biotechnology	Institute of Bioinformatics and Biotechnology, University of Pune	CGPA: 8.30/10
March 2007	Senior Secondary School Exam	JP School, Ratlam	78.22%
March 2005	Secondary School Certificate Exam	Kendriya Vidyalaya, Ratlam	92.80%

Principal academic references

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