

EDUCATION	<p>Princeton University, U.S. 2012-17 Ph.D., Chemical and Biological Engineering (CBE) Thesis: Quantitative biology of developmental Ras signaling: from molecules to morphologies Advisors: Stanislav Y. Shvartsman and Gertrud M. Schüpbach</p> <p>Indian Institute of Technology (IIT) Gandhinagar, India 2008-12 B.Tech. (Honors), Chemical Engineering</p>
RESEARCH EXPERIENCE	<p>Postdoctoral Researcher, Arjun Raj Lab, University of Pennsylvania, U.S. 2017- Developing mathematical and experimental single-cell frameworks to perturb and monitor biochemical trajectories guiding non-genetic plasticity and reprogramming in cancer.</p> <p>Research Intern, Genentech, U.S. 2016 Assisted in identifying novel regulatory mechanisms underlying the epigenetic control of tumorigenesis in cancer cells.</p> <p>Research Intern, Washington University in St. Louis, U.S. 2010 Developed data-driven regression models to predict the yield of metabolic products for multiple microbial species under different conditions.</p> <p>Research Intern, IIT Bombay, India 2009 Performed experiments and quality control tests to produce biodiesel from local feedstocks.</p>
FELLOWSHIPS & AWARDS	<p>Post-Ph.D.</p> <p>Burroughs Wellcome Fund Career Awards at the Scientific Interface[†] [\$500,000] 2020-25 Jane Coffin Childs Memorial Fund Fellowship [\$168,000] 2018-22 Schmidt Science Fellowship, in partnership with the Rhodes Trust [\$100,000] 2018-19 [†]Entire award amount deferred for use as faculty</p> <p>Ph.D.</p> <p>Gordon Wu Fellowship: Highest honor for an incoming engineering graduate student, Princeton University [\$19,000 supplement] 2012-16 William R. Schowalter Travel Fund, Princeton University [\$500/travel] 2015, 2017 People's Choice Award, Art of Science, Princeton University 2014</p> <p>Undergraduate</p> <p>Institute Gold Medal: First rank, Chemical Engineering, IIT Gandhinagar 2012 Outstanding Research Award: Class of 2012, IIT Gandhinagar 2012 Award for Undergraduate Publications, IIT Gandhinagar [₹50,000] 2012 Scholarship for Academic Excellence, IIT Gandhinagar [₹20,000] 2011-12 International Travel Grant, DST, Government of India [₹100,000] 2011 Merit-cum-Means Scholarship, IIT Gandhinagar [Full tuition + stipend] 2010-11 Travel Grant, McDonnell International Scholars Academy [\$1,500] 2010 MAGEEP Fellowship, Washington University in St. Louis [\$5,000] 2010</p>
JOURNAL PUBLICATIONS	<p>Total: 24 first/co-first author: 12 corresponding/senior author: 2 [* = equal contribution; # = corresponding author]</p> <p>*Marmion R.A., *Yang L., Goyal Y., Jindal G.A., Wetzel J.L., Singh M., Schüpbach T., and Shvartsman S.Y., “Molecular mechanisms underlying cellular effects of human MEK1 mutations”, <u>Molecular Biology of the Cell</u>, 2021.</p>

Schuh L., Saint-Antoine M.S., Sanford E.M., Emert B.L., Singh A., Marr C., Raj A., and #**Goyal Y.**, “Gene networks with transcriptional bursting recapitulate rare transient coordinated expression states in cancer”, Cell Systems, 2020.

Media coverage: [Schmidt Science Fellows](#).

Featured article: [Cell Systems](#).

Paul S., Yang L., Mattingly H.H., **Goyal Y.**, Shvartsman S.Y., and Veraksa A., “Activation-induced substrate engagement in Erk signaling”, Molecular Biology of the Cell, 2020.

Zhu L. and #**Goyal Y.**, “Art and Science: intersections through time and paths forward”, EMBO Reports, 2019.

Goyal Y., Schüpbach T., and Shvartsman S.Y., “A quantitative model of developmental RTK signaling”, Developmental Biology, 2018.

*Jindal G.A., ***Goyal Y.**, Humphreys J.M., Yeung E., Tian K., Patterson V.L., He H., Burdine R.D., Goldsmith E.J., and Shvartsman S.Y., “How activating mutations affect MEK1 regulation and function”, Journal of Biological Chemistry, 2017.

Highlighted by: [Special virtual issue, Journal of Biological Chemistry](#).

Cuellar T. L., Herzner A-M., Zhang X., **Goyal Y.**, Watanabe C., et. al., “Silencing of retrotransposons by SETDB1 inhibits the interferon response in acute myeloid leukemia”, Journal of Cell Biology, 2017.

Previewed by: Robbez M.L., Tie H.C., and Rowe H.M., Journal of Cell Biology, 2017.

***Goyal Y.**, *Levario T.J., Mattingly H.H., Holmes S., Shvartsman S.Y., and Lu H., “Parallel imaging of *Drosophila* embryos for quantitative analysis of genetic perturbations of the Ras pathway”, Disease Models & Mechanisms, 2017.

Highlighted by: [The Node](#).

*Rogers W.A., ***Goyal Y.**, Yamaya K., Shvartsman S.Y., and Levine M.S., “Uncoupling neurogenic gene networks in the *Drosophila* embryo”, Genes & Development, 2017.

Previewed by: Crews S., Genes & Development, 2017.

***Goyal Y.**, *Jindal G.A., Pelliccia J.L., Yamaya K., Yeung E., Futran A.S., Burdine R.D., Schüpbach T., and Shvartsman S.Y., “Divergent effects of intrinsically active MEK variants on developmental Ras signaling”, Nature Genetics, 2017.

Highlighted by: [F1000Prime](#).

Media coverage: [MedicalXpress](#), [EurekAlert](#), [Technology Org](#), [Medical News](#), [Princeton](#).

*Jindal G.A., ***Goyal Y.**, Yamaya K., Futran A.S., Kountouridis J., Schüpbach T., Burdine R.D., and Shvartsman S.Y., “In vivo severity ranking of Ras pathway mutations associated with developmental disorders”, PNAS, 2017.

*Johnson H.E., ***Goyal Y.**, Pannucci N., Schüpbach T., Shvartsman S.Y., and Toettcher J.E., “The spatiotemporal limits of developmental Erk signaling”, Developmental Cell, 2017.

Awarded: [Best of 2017, Developmental Cell](#).

Journal cover: [January 23, 2017 issue](#).

Previewed by: Shilo B. and Barkai N., Developmental Cell, 2017.

Highlighted by: [F1000Prime](#).

*Jindal G.A., ***Goyal Y.**, Burdine R.D., Rauen K.A., and Shvartsman S.Y., “Rasopathies: unraveling mechanisms with animal models”, Disease Models & Mechanisms, 2015.

Jenni S., **Goyal Y.**, Grotthuss M.V., Shvartsman S.Y., and Klein D.E., “Structural basis of neurohormone perception by the receptor tyrosine kinase torso”, Molecular Cell, 2015.

Goyal Y., Kumar M., and Gayen K., “Metabolic engineering for enhanced hydrogen production: a review”, Canadian Journal of Microbiology, 2013.

Kumar M., **Goyal Y.**, Sarkar A., and Gayen K., “Comparative economic assessment of ABE fermentation based on cellulosic and non-cellulosic feedstocks”, Applied Energy, 2012.

Sahu M., Wu B., Zhu L., Jacobson C., Wang W., Jones K., **Goyal Y.**, Tang Y.J., and Biswas P., “Role of dopant concentration, crystal phase, and particle size on microbial inactivation of Cu-doped TiO₂ nanoparticles”, Nanotechnology, 2011.

*Colletti P. F., ***Goyal Y.**, Varman A. M., Feng X., Wu B., and Tang Y.J., “Evaluating factors that influence microbial synthesis yields by linear regression with numerical and ordinal variables”, Biotechnology and Bioengineering, 2011.

Highlighted by: **Two year metabolic engineering issue**, Biotechnology and Bioengineering.

FORTHCOMING
PUBLICATIONS

Mellis I.A., [...], **Goyal Y.**, et. al., “Perturbation panel profiling identifies transcription factors that enhance directed changes of cell identity”. (in revision)

*Zhu L. and ***Goyal Y.**, “Retooling science with art in the age of data upsurge”, (in editorial revision, to appear in June 2021 issue of art magazine Marg).

Goyal Y., et. al., “Biochemical trajectories guiding rare cell plasticity and therapy resistance in single cancer cells”. (in preparation)

Dardani I.P., [...], **Goyal Y.**, et. al., “High-throughput and multiplexed RNA detection *in situ* with clampFISH 2.0”. (in preparation)

Kaur A., **Goyal Y.**, et. al., “Coordination between fast migrating tumor cells and their microenvironment mediates melanoma metastasis”. (in preparation)

Syal S., **Goyal Y.**, et. al., “Critical requirement of BMP signaling during embryonic primordial germ cell (PGC) specification”. (in preparation)

TALKS

[invited] Society for Mathematical Biology Annual Meeting, U.S.	2021
CSHL Systems Biology: Global regulation of gene expression, U.S.	2020
[invited] Alumni MasterClass, IIT Gandhinagar, India	2020
[public] The Rhodes House, University of Oxford, U.K.	2019
[invited] The Francis Crick Institute, U.K.	2019
[invited] Helmholtz Zentrum München, Germany	2019
[invited] Institute of Bioengineering, EPFL, Switzerland	2018
[invited] Chemical Engineering, Indian Institute of Science Bangalore, India	2017
[invited] Mathematical Institute, University of Oxford, U.K.	2017
[invited] Molecular Biosciences, Imperial College London, U.K.	2017
AIChE Annual Meeting, U.S.	2016
Molecular Biology, Genentech, U.S.	2016
[invited] Discovery Oncology, Genentech, U.S.	2016
[invited] Biophysics, UT Southwestern Medical Centre, U.S.	2016
Developmental Colloquium, Princeton University, U.S.	2016
Graduate Student Symposium, Princeton University, U.S.	2015
[invited] Chemical Engineering, IIT Gandhinagar, India	2013
64 th Annual IChE meeting, India	2011

SELECTED

EMBO: The Identity and Evolution of Cell Types[‡], Germany 2019

POSTER

Keystone Symposia Conference: Cellular Plasticity, U.S. 2019

PRESENTATIONS

Bioengineering Day^{‡‡}, Princeton University, U.S. 2015

4th International RASopathies Symposium, U.S. 2015
 56th Annual *Drosophila* Research Conference, U.S. 2015
 111th American Society for Microbiology General Meeting, U.S. 2011

‡Selected for lightening talk

‡‡Poster award, \$200

MENTORING
EXPERIENCE

Graduate students

Karun Kiani, Genetics and Epigenetics, University of Pennsylvania 2019-
 Eric Sanford[†], Genomics and Computational Biology, University of Pennsylvania 2019-20
 Lea Schuh^{††}, Mathematics, Technische Universität München 2018-19
 Shannon Keenan, Chemical Engineering, Princeton University 2016-17
 Eyan Yeung, Molecular Biology, Princeton University 2016-17

[†]Member of Mentoring Team for successful NIH F30 application

^{††}Highest Masters thesis grade

Undergraduate students

Jordan Pemberton*, Health, University of Houston Honors College 2020-
 Amy Azaria, Bioengineering, University of Pennsylvania 2019-20
 Kaijia Tian**, Chemical Engineering, Princeton University [current: analyst] 2016-17
 Kei Yamaya, Molecular Biology, Princeton University [current: Ph.D. Stanford] 2015-17
 Natalia Chen, Electrical Engineering, Princeton University [current: data scientist] 2015
 An Chu, Chemistry, Princeton University [current: Ph.D. MIT] 2014-15
 Nalin Ratnayake, Physics and Biology, UT Austin [current: Ph.D. Stanford] 2014

*Best oral presentation, American Physician Scientists Association regional meeting

**Senior thesis award

TEACHING
EXPERIENCE

Teaching Assistant, Princeton University

MAT/MAE 305: Mathematics in Engineering-I 2014
 Instructor: Yannis G. Kevrekidis

Teaching Assistant and Grader, IIT Gandhinagar

CL 207: Chemical Process Calculations 2009
 Instructor: (late)S.L. Narayanamurthy

MA 102: Linear Algebra 2009
 Instructor: Devidas Pai

MA 104: Ordinary Differential Equations 2009
 Instructor: Devidas Pai

ACADEMIC
SERVICE &
AFFILIATIONS

Reviewer, Frontiers in Cell and Developmental Biology 2020-
 Reviewer, Scientific Reports; International Journal of Molecular Sciences 2019-
 Co-reviewer, Developmental Cell; Nature; Nature Communications 2019-
 Associate Faculty Member, F1000Prime 2018-
 Reviewer, PLOS Genetics; Journal of Developmental Biology 2018-
 Co-reviewer, Development 2016-
 Reviewer, Biophysical Journal 2014-
 Student Member, American Institute of Chemical Engineers (AIChE) 2016-17
 Student Member, Genetic Society of America (GSA) 2015-16
 Institute Nominee Member, American Mathematical Society (AMS) 2011-13
 Student Member, Indian Institute of Chemical Engineers (IChE) 2011-12
 Student Member, Institute of Chemical Engineers, U.K. (IChemE) 2011-12

POSITIONS OF LEADERSHIP	President, Association of South Asians , Princeton University	2013-16
	Revived leadership within the organization for South Asian graduate students at Princeton University. Duties included securing and managing funds, collaborating with university administrators, selecting association officers, and event management.	
	CBE Departmental Representative , Princeton University	2013-16
	Selected to represent CBE graduate students in the Graduate Engineering Council (GEC). GEC holds monthly meetings, plans, and executes events catering to the diverse engineering population at Princeton.	
	Class Representative , CBE, Princeton University	2012-13
	Elected as the class representative to express graduate students' concerns. Activities involved periodic meetings with the Director of Graduate Studies, attending advisory council meetings, and organizing monthly social events.	
	Captain, Basketball Team , IIT Gandhinagar	2008-10
	Led the institute team in regional and national tournaments. Involved in team selection and organizing tournaments. Captained the Chemical Engineering basketball team and won three inter-department championships in a row.	
	Volunteer, Skype A Scientist	2017-
	Held several Skype A Scientist sessions with K-12 classrooms mostly located in remote and rural parts of the U.S.	
VOLUNTEER & OUTREACH EXPERIENCE	Volunteer, NYASA , IIT Gandhinagar	2011-12
	Provided advice for and participated in activities organized by NYASA, a student run organization dedicated to providing resources and services to local migrant construction laborers and their families.	
	Founder and coordinator, Green Gang , IIT Gandhinagar	2009-10
SCIENCE VIZUALIZATION/ COMMUNICATION	Spearheaded activities in the local community such as education and cleanliness drives, and implemented survey regarding non-conventional energy sources. Our survey was highlighted in the media .	
	Data Visualization Workshop by David McCandless	2020
	Working with Artists Webinar by Alan Alda Center for Communicating Science	2020
	Presenting Data Visually Sessions by Bang Wong	2018
	Science Communication Workshop by Alan Alda Center for Communicating Science	2018
MEDIA COVERAGE	Research and Academics	
	Schmidt Science Fellows	2020
	Princeton University	2017
	Princeton Engineering	2015
	Amar Ujala, Dainik Jagran	2006
	Awards and Fellowships	
	Schmidt Science Fellows, Princeton University, University of Pennsylvania	2020
	University of Pennsylvania	2018
	Forbes, The Times of India, Princeton University, Dainik Bhaskar	2018
	Art and Science	
	The Wall Street Journal, Princeton Alumni Weekly, Princeton University	2018
	Smithsonian, NBC, PhysOrg, Business Insider, New Scientist, Daily Mail	2014
	Extracurricular Activities	
DNA India	2009	
Hindustan Times, Amar Ujala, Punjab Kesri, Kashmir Times, Early Times	2006	