

Vaishnavi Ananthanarayanan, Ph.D.
EMBL Australia Group Leader
Single Molecule Science, University of New South Wales

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EMPLOYMENT

- **EMBL Australia Group Leader** **Nov 2020 - present**
Single Molecule Science Node, University of New South Wales, Sydney
- **Assistant Professor** **Oct 2017-Nov 2020**
Centre for BioSystems Science and Engineering, Indian Institute of Science, Bangalore
- **DST INSPIRE Faculty Fellow** **June 2014-Oct 2017**
Centre for BioSystems Science and Engineering, Indian Institute of Science, Bangalore
- **Research Assistant** **June 2009- June 2010**
Microsoft Research India, Bangalore

EDUCATION

- **Ph.D. Biophysics** **July 2010- Jan 2014**
Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany
- **B.E. (Hons.) Computer Science and M.Sc. (Hons.) Biological Sciences (dual degree)** **Aug 2004- Aug 2009**
Birla Institute of Technology and Science, Pilani, India (CGPA: 9.28/10)

PUBLICATIONS

Research Articles/Reviews

- 2022 • Choudhury, S., Ananthanarayanan, V. and Ayappa, K. G.* , Microtubule dynamics and the evolution of mitochondrial populations in fission yeast cells: A kinetic Monte Carlo study. ***Soft Matter***. 18, 4483-4492.
- Tirumala, N. A.* and **Ananthanarayanan, V.*** Visualization of single dynein molecules in mammalian cells. ***Methods Cell Biol.*** (invited chapter, in press)
- Ul Fatima, N.*, **Ananthanarayanan, V.***. Mitochondrial movers and shapers: Recent insights into regulators of fission, fusion and transport. ***Curr. Opin. Cell Biol.*** (under revision, invited review)
- 2021 • Chacko, L. A., **Ananthanarayanan, V.*** Microtubule-mitochondria attachment determines cell division and polarity in fission yeast. ***bioRxiv*** (under revision)
- Tirumala, N. A., Redpath, G., Dolai, P., Kapoor-Kaushik, N., Ariotti, N., Vijay Kumar, K. and **Ananthanarayanan, V.*** Single-molecule imaging of cytoplasmic dynein reveals the mechanism of motor activation and cargo capture. ***bioRxiv*** (under revision)
- Tirumala, N. A.* and **Ananthanarayanan, V.*** Visualization of single dynein molecules in mammalian cells. ***Methods Cell Biol.*** (invited chapter, in press)
- Shah, M., Chacko, L. A., Joseph, J. P., **Ananthanarayanan, V.*** Mitochondrial dynamics, positioning and function mediated by cytoskeletal interactions. ***Cell Mol. Life Sci.*** (invited review)
- Kumar, H., and **Ananthanarayanan, V.*** Friend or foe: The role of the host cytoskeleton in cellular responses to bacterial pore forming toxins. ***J. Indian I. Sci.*** 101, 63–71 (invited review)
- 2020 • Tirumala, N. A.* and **Ananthanarayanan, V.*** Role of dynactin in the intracellular localization and activation of cytoplasmic dynein. ***Biochemistry***. 59, 2, 156–162 (*'Future of Asia Pacific'* invited review)
- 2019 • Chacko, L. A., Mehta, K., **Ananthanarayanan, V.*** Cortical tethering of mitochondria by the anchor protein Mcp5 enables uniparental inheritance. ***J. Cell Biol.*** 218 (11) 3560-3571
- Mehta, K., Chacko, L. A., Chug, M. K., Jhunjhunwala, S., **Ananthanarayanan, V.*** Association of mitochondria with microtubules inhibits mitochondrial fission by precluding activity of the fission protein Dnm1. ***J. Biol. Chem.*** 294(10) 3385–3396
- Chacko, L. A. and **Ananthanarayanan, V.*** Quantification of mitochondrial dynamics in fission yeast. ***Bio-protocol*** 9(23): e3450.

- 2017 • Thankachan, J. M., Nuthalapati, S. S., Tirumala, N. A., **Ananthanarayanan, V.*** Fission Yeast Myosin I Facilitates PI(4,5)P₂-mediated Anchoring of Cytoplasmic Dynein to the Cortex. *Proc. Nat. Acad. Sci.* 114: E2672-E2681
- Meka, S., Chacko, L. A., Ravi, A., Chatterjee, K., **Ananthanarayanan, V.*** Role of Microtubules in Osteogenic Differentiation of Mesenchymal Stem Cells on 3D Nanofibrous Scaffolds. *ACS Biomater. Sci. Eng.* 3: 551-559
- 2016 • **Ananthanarayanan, V.***, Activation of the motor protein upon attachment: Anchors weigh in on cytoplasmic dynein regulation. *Bioessays* 38(6): 514-25
- 2015 • **Ananthanarayanan, V.*** and Tolić, I. Single-molecule imaging of cytoplasmic dynein in vivo. *Methods Cell Biol.* 125
- 2014 • Krull, A., Steinborn, A., **Ananthanarayanan, V.**, Ramunno-Johnson, D., Petersohn, U., Tolić-Nørrelykke, I*. A divide-and-conquer strategy for the maximum likelihood localization of low intensity objects. *Opt. Express* 22(1), 210-228
- 2013 • **Ananthanarayanan, V.**, Schattat, M., Vogel, S. K., Krull, A., Pavin, N.*, Tolić-Nørrelykke, I*. Dynein Motion Switches from Diffusive to Directed upon Cortical Anchoring. *Cell* 153: 1526-1536
- 2010 • **Ananthanarayanan, V.*** and Thies, W.*, Biocoder: A programming language for standardizing and automating Biology protocols. *J. Biol. Eng.* 4: 13

Science/EDI outreach

- **Morgado-Palacin, L.** Vaishnavi Ananthanarayanan: Advocating for women's representation in science. *J. Cell Biol.* (2021)
- **Ananthanarayanan, V.***. The story of science: successes, failures, luck, privilege and bias. *Mol. Biol. Cell.* (2021)
- Muralidhar, S*. and **Ananthanarayanan, V.***. TrendsTalk - BiasWatchIndia. *Trends Genet.* (2021)
- **Ananthanarayanan, V.*** Voices of the new generation: Mentorship as a junior PI. *Nat. Rev. Mol. Cell Biol.* (2020)
- **Ananthanarayanan, V.*** and Mylavarapu, S. V. S.* Meeting report – the Microtubules, Motors, Transport and Trafficking (M2T2) 2019 meeting. *J. Cell Sci.* (2020)
- **Ananthanarayanan, V.*** My INSPIRE'd Journey. *IndiaBioScience* (2019)
- **Ananthanarayanan, V.*** Plugging the 'Leaky Pipeline': Need for women-friendly workplaces in academia and how we can create them in the future. *IndiaBioScience* (2019)

*Corresponding author(s)

AWARDS AND RECOGNITION

- 2021 American Society for Cell Biology (ASCB) Junior Award for Excellence in Research (Women in Cell Biology)
UNSW School of Medical Sciences 'Values in Action' Award
Member of the Editorial Board, Journal of Biosciences
- 2020 Medal for Young Scientists, Indian National Science Academy
- 2019 Member of the Editorial Advisory Board, Journal of Cell Science
'Cell Scientist to Watch', Journal of Cell Science
Women Excellence Award, Science and Engineering Research Board (India)
RI Mazumdar Young Investigator Award
BITS Alumni Association Global 30 Under 30 Award
- 2018 EMBO Young Investigator
Wellcome Trust/DBT – India Alliance Intermediate Fellowship
Associate of the Indian Academy of Sciences
- 2016 Early Career Research Award, Science and Engineering Research Board (India)
- 2015 Innovative Young Biotechnologist Award, Department of Biotechnology (India)
- 2014 INSPIRE Faculty Award, Department of Science and Technology (India)
- 2007 JNCASR Summer Research Fellowship
Rajiv Gandhi National Talent Science Research Fellow

FUNDING (as Principal Investigator)

- Cellular organization across scales: from single molecules to whole organelles, (EMBL Australia funding from UNSW, Nov 2020-Nov 2025) ~EUR 1,128,850
 - EMBO Young Investigator Grant (2020 – until grant runs out) EUR 15,000
 - Role of microtubule-mitochondrial attachment in the maintenance of cell polarity and establishment of symmetry during cell division (Science and Engineering Research Board (India), May 2019 – Nov 2020*) ~EUR 18,900
 - Role of microtubule dynamics in mitochondrial dysfunction during the progression of neurodegeneration (Wellcome Trust-DBT/India Alliance, Jan 2019 – Nov 2020*) ~EUR 393,905
 - Intramural grant from the Indian Institute of Science (Jan 2018 – Dec 2019) ~EUR 314,826
 - Dynein behavior in vivo and the factors affecting its activation (Department of Science and Technology (India), June 2014 - June 2019) ~ EUR 108,295
 - Investigation of microtubule-mediated mitochondrial positioning and partitioning (Department of Biotechnology (India), Aug 2015 – Aug 2018) ~EUR 55,620
 - Characterization of the membrane-bound anchor of cytoplasmic dynein using super-resolution microscopy (Science and Engineering Research Board (India), Apr 2016-Apr 2019) ~EUR 48,295
- Total ~EUR 2,084,691**
(*terminated due to move to UNSW)

TRAVEL AWARDS

- EMBO Travel Award (Frontiers in Cytoskeleton Research 2017, Pune, India)
- EMBO Conference Fee Waiver (Meiosis Meeting 2017, Hvar, Croatia)
- EMBO Conference Fee Waiver (Microtubules: Structure, Regulations and Functions Conference 2016, Heidelberg, Germany)
- DST International Travel Support (Microtubules: Structure, Regulations and Functions Conference 2014, Heidelberg, Germany)
- Max Planck Society Travel Grant (64th Lindau Nobel Laureate Meeting 2014, Germany)
- MPI-CBG Travel Grant (Annual Meeting of the American Society for Cell Biology 2012, San Francisco, USA)
- FEBS Travel Grant (27th Cytoskeletal Forum Meeting 2012, Pecs, Hungary)
- IRB Barcelona Travel Grant (2nd IRB Student Symposium 2011, Barcelona, Spain)
- Pombe 2011 Travel Grant (6th International Fission Yeast Meeting 2011, Boston, USA)
- SynBERC Travel Grant (International Workshop on Biodesign Automation 2009, San Francisco, USA)

CONFERENCE PARTICIPATION

Invited Talks

- 2022
- Biophysical Society (USA) Annual Meeting, San Francisco, USA
 - University of California, Davis, USA
 - Vanderbilt University, USA (virtual visit)
 - Hunter Cell Biology Meeting, Australia
 - EMBO YI Annual Meeting, Heidelberg, Germany
 - Instituto Gulbenkian de Ciência, Portugal
 - EMBO Workshop on Birth and Fission of Cellular Compartments, Leioa, Spain
 - Emerging Concepts in Cell & Developmental Biology, Aarhus, Denmark
 - Asian Pacific Organization for Cell Biology Meeting, Taipei, Taiwan
- 2021
- American Society for Cell Biology Annual Meeting (virtual) – *Award talk*
 - Bioimage Analysis Workshop, JNCASR India
 - Rendezvous, University of Mumbai – Department of Atomic Energy, India
 - Vienna Doctoral School, Austria
 - Dynamic Cell IV, Annual Conference of the British Society for Cell Biology and Biochemical Society
- 2020
- ‘Mysteries of Microbes’ Webinar Series, MSU Baroda, India
 - World Laureates Forum, China (selected as Young Laureate)
 - Nanoengineering for Mechanobiology, Camogli, Italy 2020 (Keynote Speaker)
 - Biophysical Society Meeting on the Spatial Organization of Biological Functions, ICTS Bangalore, India
 - Statistical Biological Physics: From Single Molecule to Cell, ICTS Bangalore, India
- 2019
- Center for Regenerative Therapies, Dresden, Germany
 - EMBO Young Investigator Meeting, Singapore

- Unravelling Cellular Processes – Models and Experiments Meeting, Coorg, India
- 85th Annual Meeting of the Indian Academy of Sciences, Hyderabad, India
- Motors, Microtubules, Trafficking and Transport Meeting, NBRC, Manesar, India
- Discussion Meeting – Thirsting for Theoretical Biology, ICTS Bangalore, India
- 43rd Indian Biophysical Society Meeting, IISER Kolkata, India
- 2018 • 87th Annual Conference of the Society of Biological Chemists (India), Manipal, India
- RCB Bioimaging School, RCB Faridabad, India
- 2017 • Ruder Boskovic Institute, Zagreb, Croatia
- Natural and Artificial Molecular Machines, IIT Bombay, India
- Current Trends in Intracellular Trafficking and Molecular Motors, TIFR Mumbai, India
- Mitochondria and Metabolism Networking Conference, IISER Pune, India
- Collective Dynamics Of-, On- and Around Filaments in Living Cells: Motors, Maps, Tips and Tracks, ICTS Bangalore, India
- 2016 • 15th Anniversary Symposium of the Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany
- Computational and Experimental Studies of Microtubules and Microtubule based Motor Proteins, IIT Bombay, India
- Current Trends in Intracellular Trafficking and Molecular Motors, TIFR Mumbai, India
- Mitochondria and Metabolism Networking Conference, IISER Pune, India

Contributed Talks (selected from abstract)

- 2019 JCS Cell Dynamics: Organelle-Cytoskeleton Interactions Meeting, Lisbon, Portugal
- 2017 EMBO Frontiers in Cytoskeleton Research, IISER Pune, India
EMBO Meiosis Meeting, Hvar, Croatia
- 2016 Mechanical Forces in Cell Biology 2016, Bangalore, India
- 2012 Annual Meeting of the American Society for Cell Biology, San Francisco, USA
27th Cytoskeletal Forum Meeting, Pecs, Hungary
Microtubules: Structure, Regulations and Functions Conference, Heidelberg, Germany
35th Annual Meeting of the German Society for Cell Biology, Dresden, Germany
- 2011 2nd IRB Student Symposium- Life in Dynamics, Barcelona, Spain
- 2009 International Workshop on Biodesign Automation, San Francisco, USA

Poster Presentations

- 2018 Gordon Research Conference on Cytoskeletal Motors, Vermont USA
- 2017 Actin and microtubule cytoskeleton: bridging scales from single molecules to tissues 2017, Roscoff, France
- 2016 Microtubules: Structure, Regulations and Functions, Heidelberg, Germany
- 2014 Microtubules: Structure, Regulations and Functions, Heidelberg, Germany
- 2011 6th International Fission Yeast Meeting, Boston, USA

TEACHING

Courses

At UNSW

- **SOMS3232 Cellular Mechanisms of Health and Disease** (1 of 11 Research Lecturers, 2022-)

At IISc, Bangalore

- **Cell Mechanics (2019)**

30 hours of teaching in a semester to a class of ~25 Undergraduate and Graduate students.

- **Biology and Physiology for Engineers (with Prof. Siddharth Jhunjunwala, BSSE, 2018 – 2020)**

7.5 hours of teaching in a semester to a class of ~25 Graduate students.

Invited Instructor

- **Introduction to image analysis**

A hands-on introduction to image analysis on Fiji/ImageJ. Taught at:

- RCB Bioimaging Workshop, Regional Centre for Biotechnology, India, 2018
- International Workshop on Modern Biophysical Tools and Techniques, IIT Bombay, India, 2017
- QIP Course on Modern Biophysical Tools and Techniques, IIT Bombay, India, 2017
- Workshop of Biennial Meeting of the Indian Society of Developmental Biologists, IISER Pune, India, 2017

- **Cytoskeleton and Motor Proteins**

(As a part of the Bioengineering Workshop held at, Indian Institute of Science, 2018)

- **Advances in Cell Biology – Protein Trafficking**

(As a part of Indian Science Academies' Refresher Course for College Teachers)

MENTORING

Postdoctoral Fellows

- Gregory Redpath Feb 2021 – present
- Nida Ul Fatima Nov 2021 – present
- Zeenat Jahan Sept 2022 – present

Honours Students

- David Kim (*Hons. Student, UNSW*) May 2022 – present
- Sarah Skerhut (*Hons. Student, UNSW*) Feb 2022 – present

PhD Students

- Leeba Ann Chacko Sept 2021 – present
- Joel Joseph Dec 2019 – Nov 2020*
- Harsh Kumar (*jointly with Prof. Sandhya S. Visweswariah, IISc*) Aug 2019 – present
- Mitali Shah Aug 2018 – Nov 2020*
- Nireekshit Addanki Tirumala July 2015 – Nov 2020

Master's Students

- Leeba Ann Chacko (*Junior Research Fellow*) Dec 2017 – Nov 2020
- Rishabh Singh (*Project Assistant, now: MS Boston Univ., USA*) July 2017 – June 2018
- Kritika Mehta (*Junior Research Fellow, now: PhD UIUC, USA*) July 2017 – July 2018
- Tirthankar Sengupta (*Research Associate*) Sept 2016 – Nov 2017
- Stephen Nuthalapati (*Junior Research Fellow, now: PhD GLU Geisen, Germany*) July 2016 – July 2017
- Ashwini Ravi (*Project Assistant, now: PhD Bangalore Univ., India*) July 2015 – July 2017
- Jerrin Mathew Thankachan (*Junior Research Fellow, now: PhD IISc, India*) July 2015 – June 2016

Undergraduate Students

- Lauren Raasch (*SN Bose Summer Research Fellow from U. Michigan, USA*) Jun 2019 – Aug 2019
- Ananya Rajagopal (*Research Intern*) May 2019 – July 2019
- Anand Sankar (*Project Assistant*) Aug 2018 – Sept 2018
- Reshma Raj (*Research Intern*) Aug 2017 – Aug 2018
- Elsa Barron (*SN Bose Summer Research Fellow from U. Notre Dame, USA*) July 2018 – Aug 2018
- Aditya Jeevannavar (*Research Intern*) May 2018 – July 2018
- Keval Pandya (*MBBS Research Intern*) May 2018
- Manish Ayushman (*Research Intern, now: PhD Stanford Univ., USA*) May 2017 – July 2017
- Parth Sharma (*MBBS Research Intern*) May 2017
- Amoolya Girish (*Research Intern, now: MS U. Florida, USA*) Sept 2016 – Dec 2016
- Milind Singh (*Research Intern, now: PhD Yale Univ., USA*) May 2015 – July 2015

(*terminated due to move to UNSW)

PROFESSIONAL SERVICE

- Co-chair of the 'Cytoskeletal Synergy and Crosstalk for Cellular Function' session of the American Society for Cell Biology Annual Meeting 2021
- Co-organizer of 'Dynein 2021' virtual meeting
- Co-organizer of 'NeurofemIndia 2021: A BiasWatchIndia Conference' 2021
- Co-organizer of 'Thirsting for Theoretical Biology 2021'

- Co-chair of the 'Emerging Topics' session of the 'Microtubules: From Atoms to Complex Systems' Virtual Meeting 2020
- Co-organizer of 'Signatures of Non-equilibrium Fluctuations in Life' Meeting 2020, ICTP, Trieste, Italy (independently raised EUR 3000 from EMBO) – *postponed due to COVID-19 pandemic*
- Co-organizer of Young Investigator Meeting 2020, Mahabalipuram, India (independently raised ~EUR 6250 from the Indian Institute of Science)
- Guest Editor of the Special Issue on Cytoskeletal Mechanics, Journal of the Indian Institute of Science, 2021
- Ad-hoc reviewer for Nature Communications, Journal of Cell Biology, Review Commons, Developmental Cell, Journal of Cell Science, Biophysical Journal, Communications Biology, PLoS One, Scientific Reports, RSC Advances, Matters, ACS Applied Materials and Interfaces, ACS Biomaterials Science and Engineering
- Ad-hoc reviewer for Biotechnology and Biological Sciences Research Council grant, UK; Human Frontier Science Program (HFSP).
- Co-founder of BiasWatchIndia, an initiative to document and combat gender-biased panels at Indian science conferences and meetings
- Contributions in India and IISc: PhD thesis examiner (2 students), Comprehensive Exam/Thesis Advisory Committee Member (11 students)
- Member of the Graduate Student Review Panel, School of Medicine, UNSW