Preetham **Venkatesh**

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Education

Indian Institute of Science — *Bangalore, India*

Bachelor of Science (Research) in Chemistry, Minor in Biology — *Aug 2016 - Present*

- GPA of 8.7/10 up to seventh semester

Publications, Manuscripts and Conferences

Peer-reviewed

- G Ranjith, AA Pujar, AK Dubey, **P Venkatesh (#)**. "Antimicrobial resistance and phage therapy in the Indian context." CURRENT SCIENCE 117.4 (2019): 562. (# = corresponding author)
  - Involved in planning, coordinating and writing a commentary that reviews India's policies and laws on phage therapy and AMR

Manuscripts in Submission/Preparation

- **P Venkatesh (*)**, D Nagarajan (*), N Chandra. "PocketAnneal: A webserver for designing optimal protein ligand interfaces." Manuscript in preparation. (* = equal contribution)
  - Curated a natural protein-ligand dataset and compared performance of PocketAnneal and RosettaLigand in recovering original sequence
  - Created a webserver for PocketAnneal, the first of its kind to design optimal binding sites for ligands
  - Added a new feature to PocketAnneal that allows optimization of interface without a predetermined binding pocket

Conference

- **P Venkatesh (*)** and B Kumawat (*). "Utility functions with compounding returns lead to evolution of cooperativity in Multi-Armed Bandit networks". Accepted for Poster Presentation at ISEB2 : Indo-Swiss meeting on evolutionary biology. (* = equal contribution)
  - Developed a program to simulate agents that perform tasks and evolve in the presence of other agents in a 2D network
  - Showed that certain forms of utility functions in these agent networks lead to evolution of high levels of co-operativity
  - Determined the conditions under which specialisation and differentiation emerges in this system

Book chapter (Fictional)

- IISc Bangalore iGEM Team. (2019) "Resistance: Tales from a Post-Antibiotic World". Bangalore, India. IISc Press.

Research Projects

Investigating structural features of prion proteins using Molecular Dynamics — *IISc Bangalore*

With Prof. Govardhan Reddy, Undergraduate Thesis Project — *Aug. 2019 - Present*

- Studying the conformational landscape of a model prion dimer using bias-exchange metadynamics
- Analyzing coarse-grained MD simulation data to obtain thermodynamic properties of infectious prion mutants

Synthesis of novel SAL1 inhibitors — *Australian National University*

With Dr. Lara Malins — *May 2019 - July 2019*

- Planned, synthesized and purified novel molecular inhibitors of SAL1 phosphoadenosine phosphatase
- Verified structures of novel molecules through analysis of spectroscopic and physical data
- Analysed MD simulations and experimental data to develop hypothesis on protein-ligand interactions, and used it to design new inhibitors

PhageShift: Improving phage therapy to combat antibiotic resistance (iGEM 2018) — *IISc Bangalore*

IISc iGEM 2018 with Prof. Umesh Varshney and Dr. Sandeep Eswarappa — *Jan 2018 - Oct 2018*

- Conceptualized PACMAN, a new dual-treatment regime for bacterial infections using engineered phages and antibiotics
- Developed PhageModifier, a pipeline of computational tools for protein engineering (nominated for "Best Software Tool" award at iGEM 2018)
- Engineered the T4 bacteriophage long-tail fiber protein using PocketAnneal and Rosetta to have higher affinity for phosphoethanolamine

Designing an inhibitor for *Mycobacterium tuberculosis* thioredoxin reductase — *IISc Bangalore*

With Prof. Nagasuma Chandra — *May 2018 - July 2018*

- Virtually screened a large library of molecules to identify potential inhibitor candidates
- Performed structure-activity relationship studies to identify important structural features of successful inhibitors
- Developed a rapid computational analogue-design protocol using click chemistry principles and AutoDock scoring function

Modelling the role of nitric oxide in endothelial dysfunction — *IISc Bangalore*

With Prof. Govindasamy Mugesh — *Dec 2017 - Jan 2018*

- Literature review on role and synthesis of NO in the body
- Mapped sources of oxidant stress and mechanism of NO induced vasorelaxation

Honors & Awards

Future Research Talent Travel Award, Australian National University, 2019

- Competitive and prestigious program jointly offered by ANU College of Science and ANU College of Health and Medicine to selected students from India to pursue collaborative research at ANU for a period of 10-12 weeks

Gold Medal and Best Software Tool nomination, iGEM 2018, Boston, USA

- Developed PhageModifier, actively participated in project brainstorming, planned and carried out experiments
- Involved in writing and publishing a book and a legal review, meeting project stakeholders and organising outreach activities

Gold Medal and Best Hardware nomination, iGEM 2017, Boston, USA

- Arranged for sponsorship, crowdfunding, organised industrial visits, managed logistics and social media pages of the team

Kishore Vaigyanik Protsahan Yojana (KVPY) Fellow, 2016, DST - India

- Competitive fellowship awarded by the Department of Science and Technology, India (Selection < 1%)
- Provides stipend up to pre-PhD level, access to libraries and university facilities to encourage students to pursue careers in scientific research

Presentation

Presenter

- "PhageShift: Improving treatment of bacterial infections through novel modifications to conventional phage therapeutics", BioSystems Science And Engineering Seminar, IISc Bangalore (Feb 2019)
- "PhageShift: IISc Bangalore iGEM 2018", iGEM Jamboree, Boston, USA (Oct 2018)

Poster Presentation

- "Synthesis of novel SAL1 inhibitors", Annual Undergraduate Research Showcase, IISc Bangalore (Aug 2019)
- "Computational inhibitor design of *Mycobacterium tuberculosis* thioredoxin reductase", Annual Undergraduate Research Showcase, IISc Bangalore (Aug 2018)
- "Green chemistry in undergraduate experiments", National Science Camp, Vijyoshi (Dec 2016)

Responsibilities

Mentor

- Guided high school student, Mr. Harish Srinivasan, on a mini-project titled "Critical residue identification in enoyl acyl reductase" (Jul 2018)
- Mentored IISc Bangalore iGEM 2019 Human Practices team

Convener

- Convener, Catalysts: IISc UG Chemistry Club (Aug 2017 - Apr 2018)
  - Organized various talks on research in chemistry; planned and carried out experiments at IISc Open Day 2018
- Core Coordinator (Publicity), Pravega 2018: IISc UG Science and Cultural Fest
  - Handled a team of over 400 campus ambassadors and 25 volunteers to promote the fest; made budgetary decisions

Skills

Computational

- Programming/Scripting: Python, C, C++, BASH
- Web Development: HTML, PHP, CSS
- Softwares: Rosetta, VMD, NAMD, GROMACS, PLUMED

Laboratory

- Chemistry: Synthesis, Chromatography, Spectroscopy (1D/2D NMR, IR, Mass)
- Biology: Basic microbiology, Transformation, Protein expression

Relevant Coursework

Graduate-level

- Biology: Current Trends in Drug Discovery, Elements of Structural Biology, Principles of Genetic Engineering
- Chemistry: Physical Chemistry I and II, Organic Chemistry – Structure and Reactivity, Organic Synthesis, Bio and Medicinal Inorganic Chemistry
- Data Science: Bioinformatics, Game Theory

Undergraduate

- Biology: Basic Molecular Biology, Developmental Biology, General Biochemistry, Introductory Biology - I, II and III
- Chemistry: Thermodynamics and Electrochemistry, Basic Organometallic Chemistry, Instrumental Methods of Chemical Analysis
- Mathematics: Analysis and Linear Algebra - I and II, Probability and Statistics
- Physics: Introductory Physics - I, II and III
- Engineering: Algorithms and Programming, Introduction to Electrical and Electronics Engineering