Dolly Chetan Mehta

Ph.D. student (Final year)

RNA structure predictions | Protein:RNA interactions | Covariance analysis | RNA diversity | Hidden Markov models | structured RNA families | Gene regulatory mechanisms

CONTACT

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Dolly Mehta
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Dolly Mehta

TECHNICAL SKILLS

Programming

PERL
SHELL scripting
(includes BASH, AWK and sed)
R
Python
HTML/CSS
LaTeX

Operating Systems

Linux
Windows

Software & Tools

Sequence and Structure tools

RNA
(Infernal, Vienna RNA Package, RNAz, RNA-clust)
Protein
(Sequence homology tools, basic homology modeling, docking and MD simulations)
Data analysis
(R-scape, bacterial synteny, bacterial RNA-seq, Genome and transcriptome analysis, SHAPE-seq)
Visualization
(R2R, IGV, Chimera, Pymol, Jalview, VMD)
Statistical analysis
(R and Bioconductor, GraphPad)
Adobe Illustrator
Office

Languages

English
Hindi

EDUCATION

Ph.D. (Ongoing)

May 2016 - Present
National Centre for Biological Sciences (NCBS), Bangalore, India
SASTRA University, Thanjavur, India

Thesis: Discovery of structured RNA families in bacteria using computational approaches

Contributions:

- Genome-wide RNA structure predictions and systematic sequence and structure analyses of RNA families
- Re-engineered and improved the approach to identify distant homologs of structured RNAs
- Development and improvising the Hidden Markov (HMM) based RNA search models
- Genomic, transcriptomic and pathway analyses for target genes
- Proposing potential mechanisms of gene regulation mediated via structured RNAs

Masters of Science (M.Sc)
(Bioinformatics & Biotechnology)

June 2012 - August 2014
Institute of Bioinformatics and Applied Biotechnology (IBAB), Bangalore, India
Face-to-Face IGNOU program

Thesis: Structural basis of allostery of NADH induced derepression of redox sensing protein Rex from *S. agalactiae*: Targeted MD simulation studies & Principal Component Analysis

Contributions:

- Analyzed MD trajectories of protein Rex (transcription factor) using VMD and ProDY plugin
- Identified key residues that can modulate local changes in Rex structure on binding to ligands (NAD/NADH) using principal component analysis

Semester Project: Pilot scale fermentation for pectinase enzyme production from bacteria

Contributions:

- Screening and characterization of pectinase producing bacteria from different sources
- Standardizing conditions for for pectinase production and pilot scale fermentation with downstream processing was carried out to obtain purified enzymes

Bachelors of Science (B.Sc)
(Biotechnology)

June 2009 - July 2012
Chauhan Institute of Science, Mumbai, India (Affiliated to University of Mumbai)

PUBLICATIONS

Diversity and prevalence of ANTAR RNAs across actinobacteria

Mehta D, *Ramesh A.*
2021
BMC Microbiology. 2021 May 29;21(1).1-5.
Link to article

Discovery of iron-sensing bacterial riboswitches.

*Bandyopadhyay S**, *Chaudhury S**, ***Mehta D***, *Ramesh A.* *(*co-authors)*
2021-2020
Nature Chemical Biology. 2020 Oct 5:1-8.
Link to article
Note: This article is retracted on June 29, 2021, but the computational work remains hopeful. Clarification and my role related to this work can be obtained by Referee Dr. Arati Ramesh.

Discovery of ANTAR-RNAs and their Mechanism of Action in *Mycobacteria*

Mehta D*, *Koottathazhath A**, *Ramesh A.* *(*co-authors)*
2020
Journal of Molecular Biology. 2020 Jun 26;432(14):4032-48.
Link to article

GENERAL SKILLS

- Enthusiastic
- Communication
- Teamwork and collaborative
- Problem solving
- Logical reasoning
- Critical thinking
- Positive attitude

AWARDS

- ICMR Senior Research Fellow award (2019-present)
- CSIR Senior Research Fellow award (2019)
- EMBL, EMBO Travel Grant (2018)
- Infosys Foundation Travel award (2018)
- DBT Junior Research Fellow award: Category-II (2017)

REFERENCES (ON REQUEST)

Referee contact details for obtaining recommendation letters will be shared on request

PUBLICATIONS (CONTINUED)

A genome-wide structure-based survey of nucleotide binding proteins in *M. tuberculosis*

Bhagavat R, Kim HB, Kim CY, Terwilliger TC, ***Mehta D****, Srinivasan N, Chandra N.* 2017

Scientific Reports. 2017 Oct 2;7(1):1-4. Link to article

WORK EXPERIENCE

Teaching Assistant
(NCBS Ph.D. student practicals)

August 2017
National Centre for Biological Sciences (NCBS),
Bangalore, India

Hands on training:
1. Protein sequence homology tools
2. Protein homology modeling and structure comparison

Research Assistant

July 2014 - May 2016
Prof. Nagasuma Chandra
Indian Institute of Science (IISc),
Bangalore, India

Projects:

1. Understanding mechanism of action of drugs on *Mycobacterium tuberculosis* using network biology approach (Work with Dr. Abhilash Mohan)

Contributions:
- Analyses of the drug-target networks and improvising the network-based algorithm to identify paths that gets perturbed in response to antibiotics

2. Genome and Functional Annotation of *Mycobacterium smegmatis MC2-155* (Collaborative Project)

Contributions:
- Classification of genes to functional groups based on sequence homology to *M. tuberculosis*
- Identification and assignment of enzyme classes using protein sequence homology tools
- Automated the pipeline for homology based structure modeling of *M. smegmatis* proteome

3. Binding Site Analysis of *Mycobacterium tuberculosis* proteins for NTP binding

Contributions:
- Checked the accuracy and efficiency of in-house NTP-binding protein predictions by comparison with predictions from existing tools and softwares
- NTP-binding proteins were modeled and docked with predicted NTPs to confirm the in-house predictions

4. Screening of potential drug targets from *Mycobacterium tuberculosis H37Rv*

Contributions:
- Manual curation of high-confidence potential anti-tubercular drug targets
- Aided in creating a database of potential compounds that can be tested against selected target proteins in *M. tuberculosis*.

Teaching Assistant for course: Current Trends in Drug Discovery (August 2014)

Hands on training:
1. Protein sequence and structure homology tools
2. Protein homology modeling and protein:ligand docking

Internship

June 2013
Prof. N. Yathindra
Institute of Bioinformatics and Applied Biotechnology (IBAB),
Bangalore, India

Projects:

1.Conformational analysis of 5S rRNA and tRNA structures
2. Deciphering the configuration of amino acids at beta-chiral center

Contributions:
- For both projects, high resolution X-ray structures were analyzed using in-house PERL and R scripts to calculate different dihedrals.

MANUSCRIPTS IN PREPARATION

- **Metabolic enzymes as moonlighting RNA-binding proteins**
  Sen V, ***Mehta D***, *Ramesh A.*

WORK IN PROGRESS

- **Expression of the ANTAR protein Rv1626 in its active form remodels the metabolic state of mycobacteria**
  Mehta D*, *Koottathazhath A**, *A Achuthan*, *Gupta R and Ramesh A.* *(*co-authors)*

- **Computational discovery of bacterial riboswitch classes likely responsive to iron**
  Mehta D, *Ramesh A.*
  Note: A part of this work was retracted (mentioned in Publications) but the computational work remains hopeful.

CONFERENCES AND SYMPOSIA

NCBS Annual Talks (Presented Poster) — January 2020
NCBS, Bangalore, India

Bangalore Structural Biology Symposium (Talk) — May 2019
NCBS, Bangalore, India

EMBL Symposium: The Complex Life of RNA (Presented Poster) — October 2018
EMBL, Heidelberg, Germany

Aspects of Gene and Cellular Regulation (AOGCR) (Talk) — January 2018
Institute of Mathematical Sciences (IMSc), Chennai, India

Structure Across Scales (Presented Poster, Organization Team Member) — October 2017
NCBS, Bangalore, India

Third International Symposium: Protein Folding and Dynamics (Presented Poster) — November 2016
NCBS, Bangalore, India

Winter School on Quantitative Systems Biology (Voluntary Attendee) — December 2015
ICTS, Bangalore, India

Metabolomics (Voluntary Attendee) — January 2015
IISc, Bangalore, India

Advances in non-coding genomics (Voluntary Attendee) — September 2013
IBAB, Bangalore, India

PERSONAL INTERESTS

Sketching (Beginner) | Learning languages (Beginner) | Arts & Crafts | Painting | Cooking | Dancing