

## Dr. Swarna Kanchan

Postdoctoral Researcher

(<https://orcid.org/0000-0002-6785-8496>)

French National Institute for Computer Science and Applied mathematics (INRIA)

Pleiade Team, 200 Avenue de la vieille tour, 33405 Talence Cedex, France

**Email:** [swarnabioinfo@gmail.com](mailto:swarnabioinfo@gmail.com)

**Mobile:** +33 (0) 605674989, +33 (0) 753530833

**Skype ID:** swarnakanchan

## Educational Credentials

**PhD in Life Sciences/Bioinformatics** [2016]: Birla Institute of Technology and Sciences (BITS) Pilani, Rajasthan, India Thesis Title: “Evolution of AP endonucleases: An *in-silico* genomic and modelling study”

**Masters in Bioinformatics** [2006]: University Institute of engineering and technology, Chatrapati Sahuji Maharaj University, Kanpur, UP, India (74.45%)

**Bachelor of Fisheries Sciences** [2004]: Dr. Rajendra Prasad Central Agricultural university, PUSA, India (8.03 out of 10)

## Professional Work experience

**2018 (September ) Onwards: Postdoctoral Researcher (Bioinformatics)** at French National Institute for Computer Science and Applied mathematics (INRIA), Bordeaux, Talence -33040, France

**2016-2017:** **Assistant Professor** at Department of Biological Science, Presidency University, Bengaluru, India. Taught General Biology and Environmental science courses

**2007-2015:** **Instructor and Research Fellow** at Birla Institute of Technology and Sciences (BITS) Pilani, India. Taught Biology Laboratory, Measurement techniques, Instrumental methods of analysis courses

**2007 :** **Research Associate** at Amity institute of Biotechnology, Amity University, Noida, India. Taught Computational Biology, Genomics, Introduction to Bioinformatics Courses

## Awards & Fellowships

**2013-2015 :** Basic Science Research (BSR) Senior Research fellowship by University Grants Commission, New Delhi, India

**2010-2013 :** Basic Science Research (BSR) Junior Research fellowship by University Grants Commission, New Delhi, India

**2013 :** Travel award-Science and Communication Workshop (SciComm) organized by Wellcome-DBT trust, Hyderabad, India

**2013 :** Travel award-International Conference of Biomolecular Forms and Functions held at Indian Institute of Science, Bangalore during 8-11 January, 2013

**2007-2010:** BITS Pilani Research fellowship during PhD

**2008 :** **National eligibility test (NET) in Life Sciences** for teaching in Indian universities.

## Administrative experience and Achievements

- Member Industry interaction and placement cell, Discipline committee, Anti-ragging squad, University Research Committee at Presidency University, Bengaluru, India
- Technical programme committee member in third International Conference on Advanced Machine Learning Technologies and Applications, AMLTA 2018, held in Cairo, Egypt, on February 22–24, 2018
- Technical programme committee member in International Conference on Advanced Intelligent Systems and Informatics held at Cairo, Egypt during October 24–26, 2016.
- Technical programme committee member and reviewer in 1st International Conference on Advanced Intelligent System and Informatics, AISI 2015, November 28-30, 2015, Beni Suef, Egypt
- Member in International Conference Committee in CAB 2015: XIII International Conference on Advances in Biology, New Delhi.
- Instructor in charge, General Biology and Environmental Science courses
- Question paper Moderator for General Biology and Environmental Science courses

## Key Responsibilities/research during Post-doc:

**Project title: “*In-silico* comparative function prediction of enzymes, applied to fatty acid metabolism in microalgae”**

- Use of *in silico* methods for retrieving candidate protein sequences by automated homologous search (using biopython and bash scripts) from proteomes of interest using high performance computer clusters.
- Homologous genes/proteins further subjected to Sequence analysis and Phylogenetic Analysis/Clustering
- To explore sequence motifs and trans-membrane regions, physio-chemical properties, predictions of secondary structures ,
- Investigation of Orthologous candidates based on sequence and Phylogenetic analysis
- *In-silico* 3D protein structure prediction their quality check, refinement
- Mutation studies and their effect on the stability of desaturase protein and their effect on regio and substrate specificities
- Use of machine learning methods to predict enzyme commission number
- Docking studies of desaturase enzyme with their substrate to explore Regio and Substrate specificities
- Prediction of protein function using GO associations and Metabolic pathway modelling
- Develop *in-silico* method for prediction of Regio and Substrate specificities, qualitative or quantitative models of desaturase functional diversity, with the goal of linking it to mathematical descriptions of gene sequence diversity
- Developed program codes for automated database creation and blastp/psiblast search from multiple proteomes for blastp/psiblast, motif and pattern search, removal of duplicates from blastp results, retrieval of fasta sequences from multiple databases, merging of multiple databases, automated multiple sequence and phylogenetic analysis for large datasets, running program at high performance clusters (Using python/biopython, Bash scripts) etc.
- Present results to academic partners/collaborators and Writing manuscript as well as publish results.

## Major Research work done during PhD

### Thesis title: “Evolution of AP endonucleases: An *in-silico* genomic and modelling study”

- Lab set-up, installation of Red hat Enterprise linux and various softwares on PC/Servers and maintenance
- Data Retrieval for AP endonuclease proteins from all domains of life from NCBI database and Curation
- Automated homologous search by Blast/Psiblast using biopython and bash scripts
- Investigation of domains and motifs, conserved consensus sites at regions of functional importance
- Pairwise and multiple sequence alignment of AP endonuclease protein homologs
- Distance and Character based Phylogenetic tree generation and analysis based on genes, protein and 16S/18S rRNA gene sequences
- Comparison of gene with species tree to identify Horizontal Gene transfer
- Endosymbiotic events in evolution, ML tree analysis based on GC content bias
- Unified evolutionary mechanism of AP endonuclease protein family
- *In-silico* 3D protein structure prediction, their quality check and their refinement using Amber
- Investigation of evolution based on AP endonuclease protein 3D models
- Environmental pressure and its effect on evolution
- Synonymous and nonsynonymous mutations and their effect in shaping the evolution
- Developed program codes for measuring GC content in each AP endonuclease genes.
- Writing Manuscript, program codes (Using python/biopython, Bash scripts) and publish results

## Publications

1. **Kanchan, S.** Sharma P. & Chowdhury, S. 2019. Evolution of endonuclease IV protein family: an in silico analysis. *3 Biotech.* 9:168. [SCI, SCOPUS INDEXED] [Impact Factor: 2]
2. **Kanchan S,** Mehrotra R, Chowdhury S. 2015. *In-silico* study of endonuclease III protein family identifies key residues and processes during evolution. *Journal of molecular evolution.* 81:54–67. [SCI, SCOPUS INDEXED] [Impact Factor: 2.14]
3. **Kanchan S,** Mehrotra R, Chowdhury S. 2014. Evolutionary pattern of four representative DNA repair proteins across six model organisms: An *in silico* analysis. *Network Modeling Analysis in Health Informatics and Bioinformatics.* 3(1):70. [SCOPUS INDEXED]
4. Kesheri M, **Kanchan S,** Richa, and Sinha RP. 2014. Isolation and in silico analysis of Fe-superoxide dismutase in *Nostoc commune*. *Gene* 553(2):117-125. [SCI, SCOPUS INDEXED] [Impact Factor: 2.63]
5. Garg S, Saxena V, **Kanchan S,** Sharma P, Mahajan S, Kochar D, Das A. 2009. Novel point mutations in sulfadoxine resistance genes of plasmodium falciparum from India. *Acta Tropica.* 110(1):75-9. [SCI, SCOPUS INDEXED] [Impact Factor: 2.72]
6. Gahoi S, Mandal RS, Ivanisenko N, Shrivastava P, Jain S, Singh AK, Raghunandan MV, **Kanchan S,** Taneja B, Mandal C, Ivanisenko VA, Kumar A, Kumar R, Open Source Drug Discovery Consortium,

- Ramachandran S. 2013. Computational screening for new inhibitors of M. tuberculosis mycolyltransferases antigen 85 group of proteins as potential drug targets. *Journal of Biomolecular Structure and Dynamics*.31(1):30-43. [SCI, SCOPUS INDEXED] [Impact Factor: 3.2]
7. Kumari A., Kesheri M., Sinha RP, **Kanchan S\***. 2018. Integration of soft computing approach in plant biology and its applications in agriculture. In: Soft computing in biological sciences (Eds. H.J. Purohit, D.V.Raje, R. P. More, V. C. Kalia), pp. 265-28, Springer Nature Singapore. [SCOPUS INDEXED] [\*Corresponding Author]
  8. Priya P., Kesheri M., Sinha RP, **Kanchan S\***. 2017. Molecular dynamics simulations for Biological Systems. In: Karâa W. B. A., Dey N. (Eds.), Biomedical Image Analysis and Mining Techniques for Improved Health Outcomes, Advances in Bioinformatics and Biomedical Engineering (ABBE) Series. Chapter 14, pp 286-313. IGI Global, USA. [\*Corresponding Author]
  9. Kesheri, M., Sinha RP, **Kanchan, S\***. 2016. Advances in soft computing approaches for gene prediction: A Bioinformatics approach. In: Advancements in Bio-Medical Sensing, Imaging, Measurements and Instrumentation (Eds. N. Dey, V. Bhateja, A. E. Hassanien) Vol. 651, Ch 17, (pp. 383-405), Springer-Verlag, Germany. [SCOPUS INDEXED] [\*Corresponding Author]
  10. Kumari A., **Kanchan, S**, Kesheri, M. 2016. Applications of Bio-Molecular Databases in Bioinformatics. In: Advancements in Bio-Medical Sensing, Imaging, Measurements and Instrumentation (Eds. N. Dey, V. Bhateja, A. E. Hassanien), Vol. 651, Ch 15, (pp. 329-351). Springer-Verlag, Germany. [SCOPUS INDEXED]
  11. Kesheri M, **Kanchan S\***, Chowdhury S and Sinha RP. 2015. Secondary and Tertiary Structure Prediction of Proteins: A Bioinformatic Approach. In: Q. Zhu, A.T Azar (eds.), Complex system modelling and control through intelligent soft computations, Studies in Fuzziness and Soft Computing, Vol. 319, Chapter 19, pp 541-569, Springer-Verlag, Germany. DOI 10.1007/978-3-319-12883-2\_19. [SCOPUS INDEXED] [\*Corresponding Author]
  12. Kesheri, M., **Kanchan, S.**, Richa and Sinha, R. P. 2015. Computational methods and strategies for protein structure prediction. In: R. P. Sinha, Richa and R. P. Rastogi (eds.), Biological Sciences: Innovations and Dynamics. Chapter 12, pp. 277-291. New India Publishing Agency, New Delhi, India.
  13. Kesheri, M., **Kanchan, S\*** and Sinha, R. P. 2017. Exploring the potentials of antioxidants in retarding ageing. In: Examining the Development, Regulation, and Consumption of Functional Foods (Eds. S. Benjamin and M.K. Sarath Josh), pp. 166-195, IGI Global, USA. [\*Corresponding Author]
  14. Singla S. , Kesheri M. , **Kanchan S.** , Mishra A. 2019. Data Analysis of Air Pollution in India and its effects on health. **2019.** *International Journal of Pharma and Bioscience*. 10(2): (B) 155-169 [SCOPUS Indexed]
  15. Singla S. , Kesheri M. , **Kanchan S.**, Aswath S. 2019. Current Status and Data Analysis of Diabetes in India. *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*. 8(9):1920-1934. [SCOPUS Indexed]
  16. Kesheri, M., **Kanchan, S.**, Richa and Sinha, R. P. 2015. Oxidative stress: Challenges and its mitigation mechanisms in cyanobacteria In: Biological Sciences: Innovations and Dynamics (Eds. R. P. Sinha, Richa and R. P. Rastogi), Chapter 14, pp. 309-324. New India Publishing Agency, New Delhi, India.
  17. Ghai R., Nagarajan K., Kumar V., Kesheri M., **Kanchan S.** 2015. Amelioration of lipids by eugeniacaryophyllus extract in atherogenic diet induced hyperlipidemia. *International Bulletin of Drug Research*. 5(8):90-101.

18. Kesheri M., **Kanchan S.**, Chowdhury S. 2014. Cyanobacterial Stresses: An Ecophysiological, Biotechnological and Bioinformatic Approach. LAP Lambert Academy Publishing, Deutchshland, Germany. [ISBN: 9783848438839]
19. Galande S. H. **Kanchan S.**, Kesheri M., 2014. Drug discovery and Design: A Bioinformatics approach. LAP Lambert Academy Publishing, Deutchshland, Germany. [ISBN: 9783659536458].
20. Mittal S., Kesheri M., **Kanchan S.** 2014. Molluscs Shell Structures: An overview of Mechanical Properties. LAP Lambert Academy Publishing,. Deutchshland, Germany. [ISBN: 9783659552335].

## Key technical skills:

### Computational skills:

- ✓ **Programming Languages:** 'C', Java, Perl/Bioperl, Python/Biopython, SQL
- ✓ **Web programming and Scripting :** Html, PHP, Bash
- ✓ **Web server administration:** Apache.
- ✓ **Statistical Package:** Matlab, R, Bioconductor, SPSS, Minitab, Prism
- ✓ **Databases Management:** Mysql and Oracle (setting up, maintaining, using).
- ✓ **Operating systems:** Linux (Rpm &Debian Based), Windows (XP/NT)
- ✓ **Project management across Platform:** Conda/Miniconda/Anaconda
- ✓ **High performance computing:** Using Slurm on PFAFRIM (French cluster)
- ✓ **NCBI E-utilities:** Navigation, Retrieval, Extraction

### Next Generation Sequencing technologies/tools:

**Sequencing technologies:** Illumina Miseq, Ion Proton, PacBio RS II, Nanopore MinION

**RNA-seq:** FastQC, FastX, Trimmomatic, BWA, Bowtie2, Tophat, Star, Hisat2, Samtools, BEDtools, Picard tools, Cufflinks, Cutdiff, EdgeR, Integrative Genome Viewer, UCSC and Ensemble Genome Browser

**Chip-seq:** MACS, PeakAnalyzer, DAVID, Gostat

**Genome Assembly:** Velvet, SPAdes, IBDA

**NGS pipeline:** Galaxy

### Protein modelling/Structure Prediction and Dynamics Simulations

Discovery studio 3.5, Schrodinger, Modeller9v19, SwissModel, Raptor X, Geno3D, Esypred, Phyre2, I-TASSER, NNpredict, PHD, GorV, Psipred, Chimera, VMD, Pymol, Rasmol, Qmean, Errat2, Prosa-web, Rampage, Amber 11, Gromacs

**Computer aided Drug Design:** Autodock, Molegro Virtual Docker, FlexX, Glide

**Sequence and phylogenetic analysis** Blast, PSI-Blast, Clustalw, Mcoffee, 3Dcoffee, MAFFT, MUSCLE, Consurf2010, CD search, ChlorP, SigalP, TargetP, Weblogo 3.2., ProtFunc, Psort, Proknow, Dali, SSM, Fatcat, MEGA X, Phylip, Phylml, Treeview, IQtree

**Comparative Genomics:** Vista, ACT, Ensemble, UCSC genome browsers, NCBI Mapview

**Metabolic pathways:** Biosilico, Ecocyc, KEGG, Metacyc, WIT, Cytoscape

### Machine learning Algorithms

Artificial neural Network, Genetic Algorithms, Support Vector Machine, Decision tree, Hidden Markov Model

### **Biotechnology/Molecular Biology/Biochemical Techniques:**

Primer Design, Spectroscopy, Agrose Gel electrophoresis. Genomic DNA isolation, Native PAGE, SDS PAGE, Chromatography (TLC, Paper, GC), Qualitative and quantitative tests (inorganic & organic), Protein estimation by Lowry's method, Glucose concentration estimation by Folin-Wu's method, Lactase activity assay, Hemoglobin content estimation and Blood group typing, Widal Test, Gram staining, Mitotic index calculation, Synthetic seed preparation, Osmosis in plant cells.

### **Research Activities at Foreign countries:**

- Attended “NGS - Quality control, Alignment, Visualization” workshop held at **Bern Switzerland** during 12-14 June 2019 organized by **Swiss institute of Bioinformatics, Switzerland**
- Attended Séminar on "**Horizontal gene transfer: from acquisition to functional innovation**" by Eduardo Rocha (Head of the unit Microbial Evolutionary Genomics at Pasteur Institute) at Centre of functional Genomics, Université of Bordeaux, **Talence, France** on 21st May 2019.
- Attended training programme “**Modeling in Life Science - Dynamical Processes**” from 25–29 March at **University of Bordeaux, Talence, France**.
- Attended 13th Aquidoc Forum meeting at **Université de Bordeaux, Talence, France** on May 23, 2019.
- Attended 5th international ion mobility spectrometry meeting organized by Agilent technologies at **IECB, Pessac, France** during 19<sup>th</sup> -20<sup>th</sup> March, 2019.
- Participated and presented my research work at **16<sup>th</sup> Horizons of Molecular Biology, Max Plank institute of Biophysical Chemistry, Gottingen Germany** during 9<sup>th</sup>-12<sup>th</sup> September, 2019.

### **Peer Reviewer: Journal articles/Book chapters**

Book proposal on Machine learning and Biology, **Springer India**

Network Modeling Analysis in Health Informatics and Bioinformatics, **Springer Verlag, Vienna**

International Journal of Image Mining (IJIM), **IGI Global, USA**

Natural Product Research, **Taylor and Francis, Usa**

International Journal of Information Privacy, Security and Integrity (IJIPSI), **IGI Global, USA**

International Journal of System Dynamics Applications (IJSDA), **GI Global, USA**

Advances in Intelligent Systems and Computing (Book) published by **Springer, Germany**,

Biomedical Image Analysis and Mining Techniques for Improved Health Outcomes (Book) **IGI global, USA**.

### **Editorial board member**

**Executive Guest Editor, Open Bioinformatics journal, Bentham Science**

International Journal Of Advances In Engineering Research (e-ISSN:2231-5152, p-ISSN: 2454-1796)

International Journal Of Research In Science & Technology (e-ISSN: 2249-0604, p-ISSN:2454-180X)

International Journal Of Innovations In Scientific Engineering (e-ISSN: 2454-6402)

Ecology and evolutionary Biology (Science Publishing Group NEW YORK, NY 10018 U.S.A.)

### **Membership- Scientific Societies**

World Academy of Science Engineering and Technology, International Association of Computer Science and Information Technology (IACSIT), International Association of Engineers (IAENG), SocBiN (Society for



Bioinformatics in Northern Europe), Australian Bioinformatics Network, European Biotechnology Network, European Peptide Society, European Federation of Biotechnology (EFB), International Institute of Chemical, Biological & Environmental Engineering (IICBEE)

## **Paper Presentations/Contributions in Conferences/Symposium/Workshops**

1. **Horizons in Molecular Biology, International symposium at Max Plank Institute for Biophysical Chemistry, Gottingen , Germany, 9-12 September 2019.**
2. **International Conference on Advances in Environment and Agricultural Biotechnology-2018 (ICAEA-2018)** Department of Botany, St. Xavier's College, Ranchi, India, 22-24 February 2018.
3. **International Conference on Energy, Materials and Information Technology** organized at Amity university, Jharkhand, Ranchi, India, December, 23-24, 2017.
4. **National Symposium On Sustaining Agricultural Productivity In Arid Ecosystems: Challenges And Opportunities (SAPECO 2015)** organized at ICAR-CAZRI, RRS, Leh, Jammu & Kashmir, India, August 19-22, 2015.
5. **International conference on Global IPR systems and WTO issues.** Ch. Charan Singh University, Meerut, U.P. India, November 16-17, 2013.
6. **54<sup>th</sup> Annual conference of Association of microbiologist of India and International symposium on Frontier Discoveries and Innovations in Microbiology and its Interdisciplinary relevance (FDMIR-2013).** Maharshi Dyanand University, Rohtak, India. November 17-20, 2013.
7. **International Humboldt Kolleg on "Management of Water, Energy and Bio-resources in Changing Climate Regime: Emerging Issues and Environmental Challenges.** Jawaharlal Nehru University, New Delhi. February 8-9, 2013.
8. **International conference on Biomolecular forms and functions: A celebration of 50 years of the Ramchandran map.** Indian Institute of Science, Bangalore, India. January 8-11, 2013.
9. **International conference on Biomolecular forms and functions: A celebration of 50 years of the Ramchandran map.** Indian Institute of Science, Bangalore, India. January 8-11, 2013.
10. **International conference on Biomolecular forms and functions : A celebration of 50 years of the Ramchandran map.** Indian Institute of Science, Bangalore, India. January 8-11, 2013.
11. **International Conference on open source for computer aided translational medicine.** Institute of Microbial Technology (IMTECH), Chandigarh, India. February 22-25, 2012.
12. **Contemporary Trends in Biological and Pharmaceutical Research.** BITS Pilani, Rajasthan, India. March 12-13, 2011.
13. **National conference on Emerging trends in Life sciences research.** BITS Pilani, Rajasthan, India. March 6-7, 2009.
14. **International symposium on computational biology, Bioinformatics and synthetic biology.** University of Kerala, Trivandrum, India. January 17-19, 2008.
15. **12<sup>th</sup> International conference on Interface of chemistry biology in biomedical Research.** BITS Pilani, Rajasthan India. February 22-24, 2008.
16. **12<sup>th</sup> International conference on Interface of chemistry biology in biomedical Research.** BITS Pilani, Rajasthan India. February 22-24, 2008.
17. **International symposium on applied psychology and Environmental biology.** BITS Pilani, Rajasthan, India. October 29-31, 2007.
18. **International symposium on applied psychology and Environmental biology,** BITS Pilani, Rajasthan, India. October 29-31, 2007.
19. **"Protein Technology Workshop"** organized by Centre for Cellular and Molecular Platforms (C-CAMP)-NCBS, Bengaluru, in collaboration of **Department of Biotechnology, Govt. of India** during march 7-9, 2017.
20. National workshop **"Data Analytics Using R for Statistical Analysis"** conducted by **BITS Pilani, Rajasthan (India)** during **November 22 - 23, 2014.**
21. National Workshop **"Electronic Structure Calculations/Density Functional Theory by Schrodinger Material"** Conducted by Schrodinger India Inc. Bengaluru at BITS Pilani on November 9, 2013.

22. National Workshop “**Molecular Techniques: Cell to DNA conducted by** BITS Pilani, Rajasthan(India) during April 10-12, 2014.
23. **Science and Communication Workshop (SciComm)** organized by **Wellcome-DBT trust**, Hyderabad, India at Pragathi Resorts, Hyderabad on 27-29 November, 2013.
24. **European Bioinformatics Institute (EBI)-CCAMP** Next Generation Genomics Data Analysis Workshop held at C-CAMP (NCBS campus, Bangalore) from 13th - 16th January, 2013
25. **Pre-conference International Workshop and satellite symposium on Entrepreneurship Development.** Association of microbiologist of India held at Maharshi Dyanand University, Rohtak. November 17-20, 2013.
26. **Recent Advances in Computer Aided Drug Design and Computational Biology.** IISC, Bangalore, India. January 12, 2013.
27. **Workshop on Intellectual Property Rights Management.** BITS Pilani, Rajasthan, India. April 25, 2010.

## Personal Details

**Gender :** Male

**Father's Name :** Dr. Ram Bilash Keshri.

**Mother's Name :** Late Smt Chandrakala Keshri.

**Wife's Name :** Dr. Minu Keshri, PhD

**Permanent Address:** Village+ Post- Ranisakarpura, District- Khagaria, India.

**Date of Birth :** 05/03/1977.

**Nationality :** Indian

**Language proficiency :** English and Hindi (Both spoken and written), French (Beginner).

## References

### 1. Prof. (Dr.) Rajeshwar. P. Sinha

PROFESSOR

Centre of Advanced Study in Botany, Banaras Hindu University, Varanasi-221005, India

Email: rpsinhabhu@gmail.com

Mobile No.: +91-9235601428

### 2. Prof. (Dr.) A. Vaishampayan

EMIRATUS PROFESSOR, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi-221005, India

Email: vaishampayan\_geneticist@yahoo.co.in

Mobile No.: +91-9415201138

### 3. Brig (Dr.) Pradeep Siwach

VICE CHANCELLOR and Professor,

Indus International university, Una, Himachal Pradesh, India

Email: siwach\_pradeep@yahoo.co.in

Mobile No.: +91-9627082222

### 4. Dr. David James Sherman

SENIOR RESEARCH SCIENTIST

Team leader, Pleiade Team, INRIA Bordeaux sud ouest, 33405 Talence cedex, France

Email: david.sherman@inria.fr

Phone No.: +33 540-00-6922