




## Faculty Details proforma for DU Web-site

Title	Prof./Dr./Mr./Ms./Mrs. Prof.	First Name	Suman	Last Name	Kundu	Photograph
Designation	Professor					
Address	Department of Biochemistry B.K. Bachhawat Block University of Delhi South Campus Benito Juarez Road New Delhi – 110021					
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	Residence					
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Web-Page	<a href="http://biochem.du.ac.in/web/">http://biochem.du.ac.in/web/</a>					
<b>Educational Qualifications</b>						
Degree	Institution				Year	
Ph.D.	Banaras Hindu University				1999	
M.Phil. / M.Tech.						
PG	University of Calcutta				1994	
UG	University of Calcutta				1992	
Any other qualification						
<b>Career Profile</b>						
<p>Post-doctoral Fellow, Department of Biochemistry, Biophysics &amp; Molecular Biology, Iowa State University, USA, April 2000-Sept 2004.</p> <p>Protein Interactions Research Associate, Food and Feed Research, Pioneer Hi-Bred International Inc, USA, Oct 2004-Jan 2006.</p> <p>Lecturer, School of Biotechnology, Banaras Hindu University, Varanasi, India, Jan 2006-Dec 2006.</p> <p>Reader, Department of Biochemistry, University of Delhi South Campus, New Delhi, India, Dec 2006-Dec 2009.</p> <p>Associate Professor, Department of Biochemistry, University of Delhi South Campus, New Delhi, India, Dec 2009-Dec 2012.</p> <p>Professor, Department of Biochemistry, University of Delhi South Campus, New Delhi, India, Dec 2012 - ---</p>						
<b>Administrative Assignments</b>						
<p>Dean, Faculty of Interdisciplinary and Applied Sciences</p> <p>Head, Department of Biochemistry</p> <p>Member, FIAS, UDSC.</p> <p>Ex-Teacher-In-Charge, CD, MALDI TOF-TOF, Proteomics Facility, CIF, UDSC</p> <p>Co-ordinator, UGC-SAP Programme, Department of Biochemistry, UDSC.</p> <p>Member, BRS, FIAS</p> <p>Ex-Member, NAAC Peer Committee, UDSC</p> <p>Member, IAEC, IBSC</p>						
<b>Areas of Interest / Specialization</b>						
<p>The laboratory is dedicated to the structural and molecular understanding of protein stability, amyloidosis, protein-protein &amp; protein-ligand interactions and structure-function relationship in proteins. The ubiquitous nature of a new class of hemoglobins in plants, the presence of novel hemoglobins in the microbial world, and the discovery of new hemoglobins in humans and other vertebrates have bolstered the hemoglobin research over the last few years. The main focus of the laboratory is the investigation of novel algal, plant, bacterial and animal hemoglobins involving techniques like laser flash photolysis, stopped-flow spectrometry, FTIR and EPR spectroscopy, site directed mutagenesis, computational biology and X-ray crystallography. Emphasis is on deciphering the mechanism of regulation of ligand binding in novel hemoglobins in general. The goal is to be a part of the effort to set up a 'biophysical fingerprint' for novel hemoglobins that can help assign physiological functions. Other related proteins like hemoglobin reductases and heme oxygenases are being simultaneously investigated for a better understanding of the function(s) of the novel globins. Stability, aggregation and amyloidosis related to classical and novel hemoglobins as well as hemoglobin based artificial blood substitutes is being studied as well. Comprehensive knowledge accumulated by hemoglobin researchers world-wide may be useful in improving oxygen transport and storage in mammalian circulatory systems, nitrogen fixing efficiency in plants, sensing and response to hypoxic conditions, scavenging efficiency under stress, understanding pathological of implications of hemoglobin amyloids and our ability to use heme protein based blood</p>						

substitutes. The latter is currently being pursued fervently in the laboratory because of its translational value in medicine.

The laboratory is also focused on the spectroscopic and mass spectrometric characterization/screening of hemoglobin disorders with a goal to set up a simple, fast, economic, reliable diagnostics for such disorders using very small amounts of samples.

The laboratory also aims to seek structural insight of human dopamine  $\beta$ -hydroxylase (DBH), a drug target for complex traits. We proposed the first three-dimensional structure of DBH by *In silico* techniques. This is helping detailed investigation of structure-function relationship in this important enzyme and has laid a platform for rational therapeutic drug design. The laboratory is currently focused on the discovery of potential small molecules against DBH to combat cardiovascular diseases. Attempts are also being made to design potent molecules to combat cancer, malaria and leishmaniasis as well. Structure-based rational drug discovery and design is currently the major emphasis of the laboratory.

### Subjects Taught

Proteins – Structure, Folding and Engineering; Enzymes and Techniques in Biochemistry and Biophysics; Practicals related to Proteins and Enzymes.

### Research Guidance

#### Supervision of Doctoral Thesis,

**Awarded - Seven** (Deepak Jangir, Amit Kumar, Sheetal Uppal, Manish Shandilya, Richa Arya, Sanjay Kumar Dey Pushpanjali Dasauni)

#### **Under progress - Six**

Gaurav Kumar, Since 2015  
Asim Khan, Since 2015  
Manisha Saini, Since 2015  
Sanjeev Kumar Yadav, Since 2015  
Chetna Dhembala, Since 2017  
Shruti Bhatt, Since 2018

#### Supervision of M.Sc. Thesis

Completed - 16;  
Ongoing – 1 (Kajal Yadav)

Supervision of M.Phil. Thesis - 1  
Ravi Kant Sharma

#### Supervision of Post-doctorates - Three

Dr. Pankaj Prabhakar  
Dr. Mohsin Raza  
Dr. Swati Kundu

### Publications Profile

#### **Only in the Last Five Years (2014-2019)**

1. Arya, R., Sharma, B., Dhembala, C., Pal, R.K., Patel, A.K., Sundd, M., Ghosh, B., Makde, R.D. and Kundu, S. (2019). "A conformational switch from a closed apo- to an open holo-form equips the acyl carrier protein for acyl chain accommodation" *Biochim Biophys Acta - Proteins and Proteomics*. 1867, 163-174
2. Dasauni, P., Mahapatra, M., Saxena, R. and Kundu, S. (2018). "Refractive index of blood is a potential qualitative indicator of hemoglobin disorder in human". *J Proteins Proteomics*. 9(3), 159-168
3. Yadav, U., Arya, R., Kundu S. and Sundd, M. (2018) "The 'recognition helix' of the type II Acyl Carrier Protein (ACP) utilizes a 'ubiquitin interacting motif (UIM)' like surface to bind its partners". *Biochemistry*. 57 (26), 3690-3701
4. Shankar A, Fernandes J.L., Kaur K, Sharma M, Kundu S and Pandey GK. (2018). Rice phytooglobins regulate responses under low mineral nutrients and abiotic stresses in *Arabidopsis thaliana*. *Plant Cell Environ*. 41(1), 215-230.
5. Sharma, B., Jamdar, S.N., Ghosh, B., Yadav, P., Kumar, A., Kundu, S., Goyal, V.D. and Makde, R.D. (2017) Active site gate of M32 carboxypeptidases illuminated by crystal structure and molecular dynamics simulations. *Biochim Biophys Acta - Proteins and Proteomics*. 1865, 1406-1415
6. Mukhi, N., Kundu, S., and Kaur, J. (2017) "NO dioxygenase- and peroxidase-like activity of *Arabidopsis* phytooglobin 3 and its role in *Sclerotinia sclerotiorum* defense. *Nitric Oxide*. 68, 150-162
7. Panchaichira, T.J., Dey, S.K, Mukhopadhyay, A., Kundu, S., and Thelma, B. K. (2017) "Characterization of SNPs in the dopamine- $\beta$ -hydroxylase gene providing new insights into its structure-function relationship" *Neurogenetics* 18, 155-168.
8. Uppal, S., Singh, A.K., Arya, R., Tewari, D., Jaiswal, N., Kapoor, A., Bera, A.K., Nag, A. and Kundu, S. (2016) "Phe28B10 Induces Channel-Forming Cytotoxic Amyloid Fibrillation in Human Neuroglobin, the Brain-Specific Hemoglobin". *Biochemistry* 55, 6832-6847
9. Uppal, S., Kumar, A., Shandilya, M., Mukhi, N., Singh, A. K., Kateriya, S., Kaur, J. and Kundu, S. (2016) "Penta- and Hexa-

Coordinate Ferric Hemoglobins Display Distinct pH Titration Profiles Measured by Soret Peak Shifts". *Anal. Biochem.* 510, 120-128

10. Mukhi, N., Dhindwal, S., Uppal, S., Kapoor, A., Arya, R., Kumar, P., Kaur, J. and Kundu, S. (2016) "Structural and functional significance of the N- and C-terminal appendages in *Arabidopsis* truncated hemoglobin". *Biochemistry*. 55, 1724-1740.
11. Jebamercy, G., Durai, S., Prithika, U., Marudhupandiyan, S., Dasauni, P., Kundu, S. and Balamurugan, K. (2016) "Role of DAF-21 protein in *Caenorhabditis elegans* immunity against *Proteus mirabilis* infection". *J Proteomics*. 145, 81-90.
12. Vigneshkumar, B., Durai, S., Kundu, S. and Balamurugan, K. (2016) "Proteome analysis reveals translational inhibition of *Caenorhabditis elegans* enhances susceptibility to *Pseudomonas aeruginosa* PAO1 pathogenesis". *J Proteomics*. 145, 141-152.
13. Yadav, R., Kundu, S. and Sarkar, S. (2015) "*Drosophila* glob1 expresses dynamically and is required for development and oxidative stress". *Genesis*. 53, 719-737.
14. Kumar, A., Arya, R., Makwana, P., Dangi, R., Yadav, U., Surolia, A., Kundu, S. and Sundd, M. (2015) "The structure of the holo-acyl carrier protein of *Leishmania major* displays a remarkably different phosphopantetheinyl transferase (PPT) binding interface". *Biochemistry*. 54, 5632-5645.
15. Sharma, S., Kumar, A., Kundu, S.,\* and Bandhopadhyay, P.\* (2015). "Molecular dynamics simulations indicate that TyrosineB10 limits motions of distal Histidine to regulate CO binding in soybean leghemoglobin". *Proteins: Struct. Func. Bioinform.* 83, 1836-1848 (\* - joint corresponding author)
16. Uppal, S., Salhotra, S., Mukhi, N., Zaidi, F.K, Seal, M., Ghosh Dey, S., Bhat, R., Kundu, S. (2015) "Significantly enhanced heme retention ability of myoglobin engineered to mimic the third covalent linkage by non-axial histidine to heme (vinyl) in *Synechocystis* hemoglobin". *J. Biol. Chem.* 290, 1979-1993.
17. Singh, K., Shandilya, M., Kundu, S.\* and Kayastha, A.M.\* (2015) "Heat, acid and chemically induced unfolding pathways, conformational stability and structure-function relationship in wheat  $\alpha$ -amylase". *PLoS One*. 10(6):e0129203. (\*-joint corresponding authors).
18. Seal, M., Uppal, S., Kundu, S. and Dey, S.G. (2015) "Interaction of ApoNeuroglobin with Heme-A $\beta$  Complexes Relevant to Alzheimer's Disease". *J Biol Inorg Chem*. 20, 563-574.
19. Durai, S., Singh, N., Kundu, S.\* and Balamurugan, K.\* (2014) "Proteomic investigation of *Vibrio alginolyticus* challenged *Caenorhabditis elegans* revealed regulation of cellular homeostatis proteins and their role in supporting innate immune system". *Proteomics* 14, 1820-1832.
20. Dey, S.K and Kundu, S. (2014) "The Indian Wizard of Biophysics: Remembering G.N. Ramachandran in the International Year of Crystallography" *J. Prot. Proteomics* 5, 65-72.
21. Oshtrakh, M.I.\*, Kumar, A., Alenkina,, I.V., Zakharova, A.P., Semionkin, V.A. and Kundu, S.\* (2014) "Characterization of monomeric soybean leghemoglobin using Mössbauer spectroscopy with a high velocity resolution" *Hyp. Interact*. 226, 431-438.

#### Book Chapters

1. Dubey, V.K. and Kundu, S. (2014) "Processing of Recombinant Proteins" *In Gene and its Engineering*. First Edition Wiley India Pvt. Ltd., New Delhi, India (H. K. Das Ed). pp. 474-479
2. Kumar, A., Uppal, S., and Kundu, S. (2009) "The Red Goldmine: Promises of Biotechnological Riches" *Invited Book Chapter. Biotechnological Applications*, eds. C.S.K. Mishra, India and Dr. Pascale Champagne, Canada. IK Publishing House, Delhi.

**Total Publications : 67**

#### Conference Organization/ Presentations (in the last three years)

##### Conference Organization (last 3 years)

Symposium on "Strategies to Combat Diverse Human Diseases" November 13, 2017, Biotech Auditorium (Grant – DST-PURSE; Phase II).

Organized, Symposium on "Strategies for Insight, Detection and Intervention of Human Diseases" on 7<sup>th</sup> March, 2018, Biotech Centre Auditorium, UDSC (sponsored by UGC-SAP programme)

"Frontiers in Proteomics Research" to celebrate Proteomics Day (in collaboration with Proteomics Society, India), at S.P. Jain Centre Auditorium, UDSC, New Delhi, March 18, 2016.

"Frontiers in Life Sciences and Computational Biology: Mechanistic Understanding and Disease Relevance", March 22, 2014, Biotech Centre Auditorium, University of Delhi South Campus.

Conference Presentations : 50 oral and 95 posters (overall)

#### Research Projects (Major Grants/Research Collaboration)

- Principal Investigator, DRDO (LSRB), "Development of Hemoglobin Based Artificial Oxygen Carrier: Engineered Recombinant and Packaged Hemoglobin", 2018-2021
- Principal Investigator, DBT (Medical Biotechnology), "Screening Lead Molecules Identified by Structure-based Rational Drug Design Methods against Cytochrome b5 Reductase 3 and Dopamine Beta Hydroxylase in Spontaneously Hypertensive Rat Models for Antihypertensive Effects", 2017-2020.
- Co-Principal Investigator, DBT (part of COE-Phase II), "Systems biology of complex diseases: From genetic findings to lead molecule development for Rheumatoid arthritis", 2015-2020.
- Principal Investigator, DBT (Basic Research) project titled "Development of potent small molecule inhibitors against dopamine beta-hydroxylase to combat cardiovascular diseases", 2015-2018.
- Principal Investigator, UGC DAE-CSR project titled "Understanding the structure of *Leishmania major* phosphopantetheinyl transferase (LmjPPTase) and its interaction with cognate ACP", 2015-2020.
- Principal Investigator, DBT (Basic Research) project titled "Structure-function relationship in lupin leghemoglobin pertinent to a new, ubiquitous class of heme proteins with yet unknown physiological function", 2008-2011.
- Principal Investigator, DBT (Fast Track) project titled "Spectroscopic Characterization / Screening of Hemoglobin Disorders", 2008-2011.
- Principal Investigator, DBT (part of COE) project titled "Structure-function relationship in Dopamine Beta hydroxylase", 2008-2013.
- Student Exchange Programme (Collaboration) with University of Parma, Italy titled "Functional properties of plant hemoglobins embedded in nanoporous silica gels", 2011.
- Project Coordinator, Jointly by DST, Govt of India and Delhi University (DU-DST Purse Grant), titled "Characterizing Novel Globins Across Species and Deciphering their Stress Response and Interacting Partners: An Integrated, Holistic Approach for Function Elucidation", 2009-2012.
- Research Collaboration with Ural State Technical University-UPI, Ekaterinburg, Russia titled "Mossbauer Spectroscopy of Mammalian and other Novel Hemoglobins", 2008-2014.

#### Awards and Distinctions

- Prof. Suresh C. Tyagi Oration Award for Young Faculty, 2017, by International Academy of Cardiovascular Sciences (India Section) at its 9th Annual Conference in Vallabhbhai Patel Chest Institute, Delhi.
- Citation in Marquis Who's Who in Medicine and Healthcare 2011-2012 (8<sup>th</sup> Edition)
- DST (Government of India) Travel Award for Attending International Conference Abroad, 2008
- Indo-US Research Fellow, Indo-US Science and Technology Forum, 2010

#### Association With Professional Bodies

##### Membership

- Member, International Society of Hypertension, United Kingdom (2016)
- Life Member, Academy of Cardiovascular Sciences, India
- Executive Council and Life Member, Proteomics Society of India
- Life Member, Indian Biophysical Society.
- Early Career Member, Biophysical Society, USA.
- Life Member, Society of Biological Chemists (India)

##### Editing

- Editor-in-Chief, Journal of Proteins and Proteomics, India

##### Reviewing

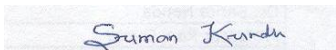
- Peer Reviewer for Protein Science, Scientific Reports, FEBS Letters, Journal of Agricultural and Food Chemistry, Indian Journal of Microbiology, PLoS One, Indian Journal of Biotechnology, Cell and Developmental Biology, Applied Biochemistry and Biotechnology, Letters in Drug Design and Discovery, F1000Research, Journal of Biomolecular Structure and Dynamics, Journal of Proteomics

- Reviewed grant applications for DST, CSIR, DBT
- Reviewed Ph.D/M.Phil Theses – Thirty four

#### Other Activities

##### Patents

1. Isolated Polynucleotide Molecules Corresponding to Mutant and Wild-type Alleles of the Maize D9 Gene and Methods of Use. (2009) Lawit, Shai J.; Kundu, Suman; Rao, Aragula, G.; Tomes, Dwight T. Affiliation: Pioneer Hi-Bred International, Inc., Johnston, Iowa, USA. US Patent No. 7,557,266.
2. Final patent with Indian Patent office, Feb 12, 2019. Title: "A novel anti-hypertensive cardio-protective composition", from University of Delhi, Application no. 20181100589.
3. "Novel Anti-hypertensive and Anti-Cardiac Hypertrophic Compounds", Suman Kundu, B.K. Thelma, Subir Kumar Maulik, Pankaj Prabhakar, Sanjay Kumar Dey), Final Indian Patent submitted (ID 201711036983), October 16, 2018; Abstract of Patent published on page number 25766 in the journal number 25/2019 on 21/06/2019.



(Signature of Faculty Member)



(Signature & Stamp of Head of the Department)

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