

Curriculum Vitae



Name: Rajat Banerjee, Ph. D.

Current position and affiliation:

ASSOCIATE PROFESSOR
DEPARTMENT OF BIOTECHNOLOGY AND DR. B C GUHA CENTRE FOR GENETIC ENGINEERING AND
BIOTECHNOLOGY
UNIVERSITY OF CALCUTTA
CALCUTTA UNIVERSITY COLLEGE OF SCIENCE
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Date of Birth: 30th September, 1970

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Education/Training:

Institution & Location	Dates attended	Degree	Conferred (mm/yyyy)	Field of Study
Calcutta University, Kolkata, India	1989-1992	B. Sc.	08/1992	Chemistry (Hons), Physics, Mathematics
Calcutta University, Kolkata, India	1992-1994	M. Sc.	06/1994	Biophysics, Molecular Biology and Genetics
Bose Institute, Kolkata, India	1995-2003	Ph. D.	12/2003	Protein Structure-function relationship, Biophysical Chemistry
Indian Association for the Cultivation of Science, Kolkata, India	2004	Postdoc	10/2004	Ultrafast spectroscopy of Supramolecular assembly

Position/Employment:

2004 -2005 Lecturer, Department of Biochemistry and Biophysics, University of Kalyani, Kalyani, West Bengal, India.

2005 - 2016 Assistant Professor, Department of Biotechnology and Dr. B.C. Guha Centre for Genetic Engineering and Biotechnology, University of Calcutta, Kolkata, West Bengal, India.

2008-2010 Visiting Professor, Department of Microbiology, Ohio State University, Columbus, Ohio, US.

2016- Associate Professor, Department of Biotechnology and Dr. B.C. Guha Centre for Genetic Engineering and Biotechnology, University of Calcutta, Kolkata, West Bengal, India

Membership:

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| 2004 | Life Member, Nuclear Magnetic Resonance Society, India |
| 2011 | Life Member, Indian National Science Congress |
| 2011 | Life Member, Society of Biological Chemist, India |

Reviewer of Biochemistry, Proteins: Structure, Function and Bioinformatics, PLoS One etc.

Awards and Honors:

- | | |
|---------|--|
| 1990 | Recipient of "Academic excellence prize" of College Examination. |
| 1992 | Recipient of National Scholarship under "National Scholarship Scheme" of Govt. of India for B. Sc. (Chemistry Honors) Examination. |
| 1994 | Selected in University Grants Commission, Govt. of India, conducted National Eligibility Test (UGC-NET) in Life Sciences, |
| 1994 | Qualified for GATE with 91 percentile |
| 1995 | Junior Research Fellowship, Bose Institute, Kolkata. |
| 1997 | Senior Research Fellowship, Bose Institute, Kolkata. |
| 2004 | Research Associate, Indian Association for the Cultivation of Science, Kolkata. |
| 2008-10 | Visiting Professor, Department of Microbiology, Ohio State University, OH, US |
| 2012 | Recipient of Travel Grant for attending XXIV tRNA conference in Olmue, Chile |

No. of Ph. D. :

Awarded Six (06), one submitted and threeworking currently.

Current postdocs in the lab:

Nil

Peer Reviewed Publications:

(# Corresponding Author)

1. Biswas P[#], Sahu DK, Sahu K, **Banerjee R**[#]. Spectroscopic studies of Asparaginyl-tRNA synthetase from Entamoeba histolytica. Protein Pept Lett. 2019 Mar 27. doi: 10.2174/0929866526666190327122419. [Epub ahead of print] PubMed PMID: 30919766.
2. Chakraborty S, Ganguli S, Chowdhury A, Ibba M, **Banerjee R**[#]. Reversible inactivation of yeast mitochondrial phenylalanyl-tRNA synthetase under oxidative stress. Biochim Biophys Acta Gen Subj. 2018, 1862(8):1801-1809.
3. Chowdhury A, Choudhury A, Chakraborty S, Ghosh A, Banerjee V, Ganguly S, Bhaduri G, **Banerjee R**[#], Das K[#], Chatterjee IB[#]. p-Benzoquinone-induced aggregation and perturbation of structure and chaperone function of α -crystallin is a causative factor of cigarette smoke-related cataractogenesis. Toxicology. 2018, 394, 11-18.
4. Debnath A, Sabui S, Wajima T, Hamabata T, **Banerjee R**, Chatterjee NS[#]. Functional Role of N- and C-Terminal Amino Acids in the Structural Subunits of Colonization Factor CS6 Expressed by Enterotoxigenic Escherichia coli. J Bacteriol. 2016, 198, 1429-41.
5. Ghosh A, Banerjee S, Mitra A, Muralidharan M, Roy B, **Banerjee R**, Mandal AK, Chatterjee IB[#]. Interaction of p-benzoquinone with hemoglobin in smoker's blood causes alteration of structure and loss of oxygen binding capacity. Toxicol Rep. 2016, 3, 295-305.
6. Banerjee B, **Banerjee R**[#]. Urea Unfolding Study of E. coli Alanyl-tRNA Synthetase and Its Monomeric Variants Proves the Role of C-Terminal Domain in Stability. J Amino Acids. 2015, 2015, 805681.
7. Anand U, Ray S, Ghosh S, **Banerjee R**[#], Mukherjee S[#]. Structural aspects of a protein-surfactant assembly: native and reduced States of human serum albumin. Protein J. 2015, 34(2):147-57.
8. Ray SK[#], Baruah VJ, Satapathy SS, **Banerjee R**. Cotranslational protein folding reveals the selective use of synonymous codons along the coding sequence of a low expression gene. J Genet. 2014, 93, 613-7.
9. Sarkar K., Ray B., **Banerjee R.**, Saha S., Roy S. & Chatterjee S[#]. "Poly- β -hydroxybutyrate (Bio-plastic) production utilizing waste effluent of a sugar industry." IOSR-JESTFT, 2014, 8. 26-31.

10. Ray S, Banerjee V, Blaise M, Banerjee B, Das KP, Kern D, **Banerjee R[#]**. Critical role of zinc ion on E. coli glutamyl-queuosine-tRNA(Asp) synthetase (Glu-Q-RS) structure and function. *Protein J.* 2014, 33, 143-9.
11. Banerjee B, **Banerjee R[#]**. Guanidine hydrochloride mediated denaturation of *E. coli* Alanyl-tRNA synthetase: identification of an inactive dimeric intermediate. *Protein J.* 2014, 33, 119-27.
12. Ray S, Blaise M, Roy B, Ghosh S, Kern D, **Banerjee R[#]**. Fusion with anticodon binding domain of GluRS is not sufficient to alter the substrate specificity of a chimeric Glu-Q-RS. *Protein J.* 2014, 33, 48-60.
13. Chowdhury A, Choudhury A, Banerjee V, **Banerjee R[#]**, Das KP[#]. Spectroscopic studies of the unfolding of a multimeric protein α -crystallin. *Biopolymers.* 2014, 101, 549-60.
14. Choudhury A, **Banerjee R[#]**. The N-terminal fragment of *Acanthamoeba polyphaga* mimivirus tyrosyl-tRNA synthetase (TyrRS(apm)) is a monomer in solution. *FEBS Lett.* 2013, 587, 590-9.
15. Saha R, Dasgupta S, **Banerjee R**, Mitra-Bhattacharyya A, Söll D, Basu G[#], Roy S[#]. Functional Loop Spanning Distant Domains of Glutamyl-tRNA Synthetase Also Stabilizes a Molten Globule State. *Biochemistry.* May 22, 2012.
16. Chowdhury A, Sen Mojumdar S, Choudhury A, **Banerjee R[#]**, Das KP[#], Sasmal DK, Bhattacharyya K[#]. Deoxycholate induced tetramer of α A-crystallin and sites of phosphorylation: fluorescence correlation spectroscopy and femtosecond solvation dynamics. *J Chem Phys.* 136, 155101, 2012.
17. Ghosh A, Choudhury A, Das A, Chatterjee NS, Das T, Chowdhury R, Panda K, **Banerjee R[#]**, Chatterjee IB[#]. Cigarette smoke induces p-benzoquinone-albumin adduct in blood serum: Implications on structure and ligand binding properties. *Toxicology.* 292(2-3), 78-89, 2012.
18. Sasmal D., Mondal T., Mojumdar S., Choudhury A, **Banerjee R** and Bhattacharyya K[#]. A FCS Study of Unfolding and Refolding of CPM-Labeled Human Serum Albumin: Role of Ionic Liquid" *J. Phys. Chem. B,* 115, 13075-83, 2011.
19. Mallick S., Dutta A., Ghosh J., Maiti S., Mandal A.K., **Banerjee R.**, Bandyopadhyay C., Pal C[#]. Protective Therapy with Novel Chromone Derivative against Leishmania donovani Infection Induces Th1 Response in vivo. *Chemotherapy,* 57:388-393, 2011.
20. **Banerjee R[#]**, Reynolds NM, Yadavalli SS, Rice C, Roy H, Banerjee P, Alexander RW and Ibba M. Mitochondrial aminoacyl-tRNA synthetase single nucleotide polymorphisms that lead to defects in refolding but not aminoacylation. *J Mol Biol.* 410, 280-93, 2011.
21. Mukherjee S[#], Chowdhury S, Paul AK and **Banerjee R**. Selective extraction of palladium(II) using hydrazone ligand: A novel fluorescent sensor *Journal of Luminescence,* 131, 2342-2346, 2011.
22. Katz A, **Banerjee R**, de Armas M, Ibba M, Orellana O[#]. Redox status affects the catalytic activity of glutamyl-tRNA synthetase. *Biochem Biophys Res Commun.* 398(1), 51-5, 2010.
23. Goltermann L, Larsen MSY, **Banerjee R**, Joerger AC, Ibba M and Bentin T[#]. Protein Evolution via Amino Acid and Codon Elimination. *PLoS ONE* 5, e10104, 2010.
24. Reynolds NM, Ling J, Roy H, **Banerjee R** and Ibba M[#]. Cell-specific differences in the requirements for translation quality control, *Proc. Natl Acad. Sci., USA,* 107, 4063-68, 2010.
25. Chatterjee S[#], Roy B, Roy D and **Banerjee R**. Enzyme mediated biodegradation of heat treated commercial polyethylene by staphylococcal species. *Polymer degradation and stability.* 95, 195-200, 2010.
26. **Banerjee R**, Chen S, Dare K, Gilreath M, Praetorius-Ibba M, Raina M, Reynolds NM, Roy TR, Yadavalli SS, Ibba M[#]. tRNAs: cellular barcodes for amino acids. *FEBS Lett.* 584, 387-95, 2010.
27. Yadavalli SS, Klipcan L, Zozulya A, **Banerjee R**, Svergun D, Safro M, Ibba M[#]. Large-scale movement of functional domains facilitates aminoacylation by human mitochondrial phenylalanyl-tRNA synthetase. *FEBS Lett.* 583, 3204-8, 2009.
28. Dasgupta S, Saha R, Dey C, **Banerjee R[#]**, Roy S, Basu G[#]. The role of the catalytic domain of E. coli GluRS in tRNA^{Gln} discrimination. *FEBS Lett.* 583, 2114-20, 2009.
29. Roy B, **Banerjee R**, Chatterjee S[#]. Isolation and identification of poly beta hydroxybutyric acid accumulating bacteria of Staphylococcal sp. and characterization of biodegradable polyester. *Indian J Exp Biol.* 47, 250-6, 2009.
30. Ghosal A, Bhowmick R, **Banerjee R**, Ganguly S, Yamasaki S, Ramamurthy T, Hamabata T, Chatterjee NS[#]. "Characterization and studies of the cellular interaction of native colonization factor CS6 purified from a clinical isolate of enterotoxigenic Escherichia coli." *Infect Immun.* 77, 2125-35 2009.
31. Blaise M, Olieric V, Sauter C, Lorber B, Roy B, Karmakar S, **Banerjee R**, Becker HD, Kern D[#]. "Crystal structure of glutamyl-queuosine tRNA^{Asp} synthetase complexed with L-glutamate: structural elements mediating tRNA-independent activation of glutamate and glutamylation of tRNA^{Asp} anticodon." *J Mol Biol.* 381, 1224-37. 2008.
32. Ataide S. F., Wilson S. N., Dang S., Rogers T. E., Roy B., **Banerjee R.**, Henkin T. M., and Ibba M[#]. "Mechanisms of resistance to an amino acid antibiotic that targets translation." *ACS Chemical Biology.* 2, 819-827. 2007.
33. Basu C., Chowdhury S., **Banerjee R.**, Stoeckli-Evans H. and Mukherjee S[#]. "A novel blue luminescent high-spin iron(III) complex with interlayer O-H...Cl bridging: Synthesis, structure and spectroscopic studies." *Polyhedron* 26, 3617-3624, 2007.
34. **Banerjee R.***, Dubois D. Y.*, Gauthier J., Lin S. X., Roy S. # and Lapointe, J. # "The zinc-binding site of a class I aminoacyl-tRNA synthetase is a SWIM domain that modulates amino acid binding via the tRNA acceptor arm." *Eur J Biochem.* 271, 724-33, 2004. * Contributed equally
35. **Banerjee R.**, Mandal A. K., Saha R., Guha S., Samaddar A., Bhattacharya A. and Roy S[#]. "Solvation change and ion release during aminoacylation by aminoacyl-tRNA synthetases." *Nucleic Acids Res.* 31, 6035-42, 2003.

36. Mandal A K., Samaddar S., **Banerjee R.**, Lahiri S., Bhattacharyya A. and Roy S[#]. "Glutamate counteracts the denaturing effect of urea through its effect on the denatured state." J Biol. Chem. 278, 36077-84, 2003.
37. Sen P., Mukherjee S., Dutta P., Halder A., Mandal D., **Banerjee R.**, S. Roy S. and Bhattacharyya K[#]. "Solvation Dynamics in the Molten Globule State of a Protein." J. Phys. Chem. B 107, 14563-568, 2003.
38. Mandal D., Sen S., Sukul D., Bhattacharyya K[#], Mandal A. K., **Banerjee R.** and Roy S. "Solvation Dynamics of a Probe Covalently Bound to a Protein and in an AOT Microemulsion: 4-(N-Bromoacetyl-amino)-Phthalimide." J. Phys. Chem. B. 106, 10741-10747, 2002.
39. Bhattacharyya A., Mandal A.K., **Banerjee R.** and Roy S[#]. "Dynamics of compact denatured states of glutaminyl-tRNA synthetase probed by bis-ANS binding kinetics." Biophys Chem., 87, 201-12, 2000.

Book Chapter:

1. Chowdhury A, **Banerjee R.**, and Das K.P. Das, Biophysical Studies of a Micellar Protein α -Crystallin by Fluorescence Methods pp. 737 Chapter 60, Ed: Hiroyuki Ohshima (Editor) Encyclopedia of Biocolloid and Biointerface Science, Volume 2, August 2016 ISBN: 978-1-118-54276-7 WILEY, International

Seminars, Conferences, Symposia, Workshops etc attended

Name of the Seminars, Conferences, Symposia, Workshop etc	Name of the sponsoring agency	Place	Date
1) Symposium on NMR, Drug Design and Bioinformatics.	DST, Bose Institute	Kolkata, India	Feb 17-20, 2004.
2) Symposium on Advances in Bioinorganic Chemistry (SABIC-2004) in Conjunction with Second Asian Biological Inorganic Chemistry Conference (AsBIC-II).	TIFR, SBIC, TWAS	Goa, India	Dec 5-10, 2004
3) 21 st International tRNA Workshop.	DST, CSIR, DBT, IISc etc	Bangalore, India	Dec 2-7, 2005
4) International Symposium on Nano-Bio interface.	DBT, UGC, Calcutta University	Kolkata, India	Mar 1-3, 2006
5) National Symposium on 21 st Century Research in Biochemistry & Biophysics.	DST, Kalyani Univ	Kalyani, India	Feb 1-3, 2007
6) Rustbelt RNA Meeting.	NSF USA, Varion, Sigma-Aldrich, Dept of Microbiol, Ohio State Univ etc	Columbus, OH, USA	Oct 17-18, 2008
7) Principles of fluorescence techniques 2009	ISS	Chicago, IL, USA	April 8-11, 2009
8) 23 rd tRNA Workshop	Universidade de Aveiro, CESAM, FCT etc	Aveiro, Portugal	Jan 28-Feb 2, 2010
9) National Workshop on Protein Folding	DBT, Kalyani University	Kalyani, India	Nov 23-25, 2010
10) Frontiers in Modern Biology -2012	IISER, Kolkata	Mohanpur, India	Feb 4-5, 2012

11) Recent Advances in Chemical and Physical Biology	SINP, Kolkata	Kolkata, India	Mar 5-7, 2012
12) Sixth RNA Group Meeting	IISc, Bangalore	Bangalore, India	Mar 30-31, 2012
13) International Symposium on Protein Folding and Dynamics	NCBS, Bangalore	Bangalore, India	Oct 15-17, 2012
14) XXIV tRNA Conference	Olmue, Chile	Olmue, Chile	Dec 2-6, 2012
15) Origins 2014	The International Astrobiology Society and Bioastronomy	Nara, Japan	July 6-11, 2014
16) 26th tRNA Conference	Seoul National University, Korea	Jeju, Korea	Sep 4-8, 2016
17) 27th tRNA Conference	University of Strasbourg	Strasbourg, France	Sep 24-28, 2018
18) 10th RNA Meeting	RGCB, Kerala	Kovalam, Kerala	May 2-4, 2019

Invited Lectures:

1. **"Thermodynamic characterization of the binding of substrates on Glu-Q-tRNA(Asp) synthetase from *Escherichia coli*: A paralog of Glutamyl-tRNA synthetase"** at Birla Institute of Technology, Mesra, Ranchi in the inaugural symposium 'Microbiology: Current Trends, Applications and Advances' on April 5-6, 2007.
2. **"Naturally occurring genetic variants in human mitochondrial protein refolding: implications for organelle dysfunction."** In PROTEO Conference, University of Laval, Quebec, Canada, 25th September, 2009.
3. **"Protein refolding defect of naturally occurring genetic variants in human mitochondrial protein may led to organelle dysfunction."** In BIOINFORMATICS INFRASTRUCTURE FACILITY, Department of Biochemistry & Biophysics University of Kalyani, Kalyani, Nadia, West Bengal Workshop on "Protein Folding" on 23-25th November 2010.
4. **"Role of Anticodon Binding Domain of Mimi virus Tyrosyl-tRNA Synthetase (TyrRS_{apm}) in dimerization"** in Sixth RNA Group Meeting, Indian Institute of Science, Bangalore, India, 30-31st March 2012.
5. **"Characterization of DNA binding by *E. coli* Alanyl-tRNA synthetase"** at 26th tRNA Conference at Jeju, South Korea, 04/09-08/09/16.
6. **"Biophysical characterization of Mitochondrial Phenylalanyl-tRNA Synthetase and its mutants: A Spectroscopic View"** 21st Nov 2016, Department of Life Sciences, National Central University, Taiwan
7. **"Understanding Promoter DNA-AlaRS interaction using Biophysical Tools."** 22nd Nov 2016, Department of Life Sciences, National Central University, Taiwan
8. **"A Biophysical Tale of Two Aminoacyl-tRNA Synthetases from the Eukaryotic Human Pathogen *Entamoeba histolytica*"** 23rd Nov 2016, Department of Life Sciences, National Central University, Taiwan
9. **"Reversible inactivation of yeast mitochondrial phenylalanyl-tRNA synthetase under oxidative stress"** 27th Sep 2018, tRNA conference, Strasbourg, France, Sep 23-27, 2018.
10. **"Biophysical characterization of Alpers encephalopathy associated mutants of human mitochondrial phenylalanyl-tRNA synthetase"** 2nd May, 2019, 10th RNA meeting, May 2-4, Kovalam, Kerala, 2019.

Completed Projects:

S. No.	Title	Agency	Total Grant Sanctioned (in Lakhs)	Period
1.	Mechanism of minihelix recognition by aminoacyl-tRNA synthetases (PI)	Department of Science and Technology (DST), Govt. of India	~8.32	2006-2009
2.	Mechanism of substrate recognition by truncated glutamyl-tRNA synthetase (Co-	Council for Scientific and Industrial Research	~15	2006-2009

	PI)	(CSIR), Govt. of India		
3.	Expression of Plasmodium falciparum tubulin in baculovirus insect cell system for development of antimalarial drug (Co-PI)	Board of Research in Nuclear Sciences- Department of Atomic Energy (BRNS-DAE), Govt. of India	~14	2006-2009
4.	Secret sharing schemes using DNA cryptography	Ministry of Communication and Information Technology, Govt. of India	~ 23	2007-2009
5.	Biochemical and biophysical studies on the interaction of p-benzoquinone with human serum albumin: Implication on alteration of structure and fatty acid binding property (Co-PI)	Council for Scientific and Industrial Research (CSIR), Govt. of India	~44	2009-2012
6	Development of Aspartyl-tRNA synthetase from Entamoeba histolytica as a target for antimicrobial drugs against amebiasis.	SERB-DST Government of India	29.20	2013-2016
7	Protein Folding Kinetics is a selection force on shaping codon usage bias in the high expression genes	DBT-NE Twinning Programme, Government of India	42.32	2014-2017
8	Characterization of Aspartyl-tRNA synthetase from Entamoeba histolytica by spectroscopic methods.	DBT-NE Twinning Programme, Government of India	45.55	2014-2018

Details of the project running in the department

Sl. no	Name of the project	Name of PI/Co-PI	Duration	Amount	Funding agency
1	Functional and structural correlations between mitochondrial phenylalanyl-tRNA synthetase mutations and fatal infantile Alpers encephalopathy	Dr. Rajat Banerjee (PI)	3 years (2016-2020)	39.76 lakhs	SERB-DST Government of India

Collaborators:

1. Professor Michael Ibbá (Department of Microbiology, Ohio State University)