

Contact Information**Tuhin K. Guha**

Postdoctoral Associate

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Work experience**Postdoctoral Associate****Mar. 2017 – Nov. 2017****Department of Biochemistry, Schulich School of Medicine and Dentistry****University of Western Ontario, Canada [Dr. David Edgell's lab]**

- Testing genome editing efficiencies of modified CRISPR/Cas9 system in mammalian cells (HEK)
- *In vivo* delivery of modified CRISPR/Cas9 reagent (TevCas9) using microinjection in *Xenopus* embryo and transfection/electroporation of protein-oligos in HEK cells for gene repair studies
- Evaluating homologous recombination mediated gene repair through FACS studies

Research Associate**Sep. 2016 – Feb. 2017****Department of Microbiology, University of Manitoba, Canada**

- Conducted protein expression and purification of 2 DNA-cutting enzymes for characterization
- Performed DNA extraction and sequence analysis to identify 8 unknown fungal species producing antibiotics (collaborated with the Bioengineering Department, University of Manitoba)
- Contributed towards scientific publications (2 peer-reviewed articles and an invited review)

Education**Ph.D., Microbiology, University of Manitoba, Canada****2011 – 2016**

Thesis topic: Biochemical characterization of homing endonucleases encoded by fungal mitochondrial genomes. (Supervisor: Dr. Georg Hausner)

M.Sc., Microbiology, University of Manitoba, Canada**2009 – 2011**Thesis topic: Purification of subset of *Saccharomyces cerevisiae* peroxisomal proteins (Supervisor: Dr. Peter C. Loewen)**M.Sc., Genetics, University of Calcutta, India****2004 – 2006****B.Sc., Zoology (Hons.), University of Calcutta, India****2001 – 2004****Ph.D. research highlights**

- Developed an innovative “on/off switch” for temporal regulation of a DNA-cutting enzyme
- Biochemically characterized a DNA-cutting enzyme for biotechnological applications

- Designed an alternative method to detect the endonuclease activity of a DNA-cutting enzymes

Research experience

- CRISPR-Cas9 for gene knockout / gene repair; Modified Cas9 for effective gene repair
- Microinjection in oocytes, electroporation of mammalian cells & transfection in human cells
- High-content microscopy (Fluorescence microscopy) , Flow cytometry
- Protein purification using HIC, IEC, HA, SEC Affinity both manually, and using Akta-FPLC
- Protein screening for crystallography: Crystal tray setting using Gryphon robotics
- Mammalian cell / tissue culture maintenance using sterile techniques
- Generation of transient and stable mammalian cell lines for protein expression
- DNA / RNA isolation from mammalian cells and bacterial samples
- RNA biology, in vitro transcription and translation, cDNA synthesis (RT-PCR), RT-qPCR
- Molecular cloning strategies including GoldenGate assembly, Mutagenesis, DNA Sequencing
- Recombinant protein expression (prokaryotic system, eukaryotic expression system)
- Western Blot, Coimmunoprecipitation (for protein-protein interaction study)
- DNA / RNA quantification and detection assay, RNA splicing assays, in vitro assays, RNA weasel, mfold
- Bioinformatics: PHYRE2, PyMOL, CLUSTAL, MAFFT, GeneDoc, FASTA, CAPS3, MEGA

Publication summary

Research articles: 6

Review article (invited): 2

Book chapters (invited): 2

Publications

Guha TK, Edgell DR. Applications of alternative nucleases in the age of CRISPR/Cas9 (Manuscript submitted in International Journal of Molecular Sciences)

Guha TK, Wai A, Hausner G. Programmable Genome Editing Tools and their Regulation for Efficient Genome Engineering. *Comput Struct Biotechnol J.* **2017**, 15:146-160. doi: 10.1016/j.csbj.2016.12.006.

Guha TK, Hausner G. Insertion of Group II Intron-Based Ribozyme Switches into Homing Endonuclease Genes. *Methods Mol Biol.* **2017**, 1498:135-152. doi: 10.1007/978-1-4939-6472-7_9.

Guha TK^a, Wai A^a, Mullineux ST, Hausner G. The intron landscape of the mtDNA cytb gene among the Ascomycota: introns and intron-encoded open reading frame. *Mitochondrial DNA Part A.* **2017**, doi: 0.1080/24701394.2017.1404042 (^a = equal contribution).

Bilto IM, **Guha TK**, Wai A, Hausner G. Three new active members of the I-OnuI family of homing endonucleases. *Can J Microbiol.* **2017**, 63(8):671-681. doi: 10.1139/cjm-2017-0067.

Guha TK, Hausner G. Using Group II Introns for Attenuating the In Vitro and In Vivo Expression of a Homing Endonuclease. *PLoS One.* **2016**, 11(2):e0150097. doi: 10.1371/journal.pone.0150097.

Hafez M, **Guha TK**, Hausner G. I-OmiI and I-OmiII: two intron-encoded homing endonucleases within the *Ophiostoma minus* rns gene. *Fungal Biol.* **2014**, 118(8):721-31. doi: 10.1016/j.funbio.2014.05.002.

Hafez M, **Guha TK**, Shen C, Sethuraman J, Hausner G. PCR-based bioprospecting for homing endonucleases in fungal mitochondrial rRNA genes. *Methods Mol Biol.* **2014**, 1123:37-53. doi: 10.1007/978-1-62703-968-0_3.

Guha TK, Hausner G. A homing endonuclease with a switch: characterization of a twintron encoded homing endonuclease. *Fungal Genet Biol.* **2014**, 65:57-68. doi: 10.1016/j.fgb.2014.01.004.

Tian M, Wai A, **Guha TK**, Hausner G, Yuan Q. Production of cellulase and xylanase from food waste by solid-state fermentation. *Process Biochemistry.* (Manuscript submitted)

Conference presentations

Guha, T.K.*, and Hausner, G. Controlling a DNA chopper: Group II introns as attenuators for homing endonuclease expression. Biophysical Society of Canada. 1st - 3rd June, 2016; University of Manitoba, Winnipeg, Canada.

Guha, T.K.*, and Hausner, G. On-switch regulators in action: Regulation of a Homing endonuclease by group II introns. Canadian Society of Microbiologists, 15th - 18th June, 2015; University of Regina, Saskatoon, Canada.

Guha, T.K.*, and Hausner, G. A twintron encoded homing endonuclease with an on-switch. Keystone Symposia, Keystone Symposia- Precision genome engineering and synthetic biology. 11th - 16th January, 2015; Big Sky, Montana, USA.

Guha, T.K.*, and Hausner, G. A homing endonuclease with a switch: Characterization of a twintron encoded homing endonuclease. Canadian Society of Microbiologists, 17th - 20th June, 2013; Carleton University, Ottawa, Canada.

Other conferences (attended)

International Conference on Frontier Researches in Integrative Physiology (2007), Department of Physiology, Calcutta University, West Bengal, India.

International Conference on Chromosomes to Neurons (2007), Molecular Biology & Genetics, Department of Biophysics, Calcutta University, West Bengal, India.

21st Century Research in Biochemistry and Biophysics (2007), Department of Biochemistry & Biophysics, University of Kalyani, West Bengal, India.

Previous experiences

Short Laboratory Training on Genetic Experiments, Department of Life Sciences, Jadavpur University, West Bengal, India (2007)

- Isolation of plasmid and mammalian DNA
- Southern Hybridization, Radio labeling DNA probes for Nick Translation
- Protein Extraction from bacterial cultures

Summer Project in Forensic Serology from Central Forensic Science Laboratory (C.F.S.L), Kolkata, Ministry of Home Affairs, Govt. of India (2005)

- DNA extraction from dried blood stains
- Absorption Elution Techniques for blood grouping from dried blood stains
- Age determination by racemization of Aspartic acid
- Blood stain geometry
- Fingerprint lifting techniques
- Synthetic fiber examination

Scholarships / Awards

International Graduate Student Scholarship (IGSS), University of Manitoba (2012 - 2013, CAD 8000)
Faculty of Science Graduate Scholarship (FSGS), University of Manitoba (2011 - 2013, CAD 10000 / year)

International Graduate Student Entrance Scholarship (IGSES), University of Manitoba (2009 -2010, CAD 8000)

Scientific memberships

Canadian Society for Microbiologists 2013 – 2015
Biophysical Society of Canada 2016 – Present

Professional experience (July. 2006 – Nov. 2008)

Worked as a Laboratory Assistant in the microbiological laboratory of Chemicals and Petrochemicals Ltd. (Bureau of Indian Standards (ISI) and Drugs Control), Govt. of West Bengal, India. Performed standardized lab tests to verify fitness of products, interpreted and recorded data.

Teaching & Supervisory experience (2009 – 2014)

Teaching assistant in the Department of Microbiology, University of Manitoba

Taught “Membrane and Cellular Biochemistry” course (MBIO 3460) to a capacity of 60-65 undergraduate students. The course included characterization of membrane fractions; structure, properties, and analyses of membrane lipids; structure, properties, and analyses of membrane proteins. I have also conducted lab sessions, prepared quiz, and marked course examinations. Supervised several undergraduate project students, summer students, and junior graduate students.