Indian Institute of Science Education and Research Kolkata

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EXPLORING LIFE

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IISER KOLKATA

DEPARTMENT OF BIOLOGICAL SCIENCES

We live in a world of activities, thoughts,
experiments, people, meetings, classes and so on.
Organized as a brochure, here is our department.

Contents

Message from the Director

This book contains academic profiles of faculty members of the Department of Biological Sciences, Indian Institute of Science Education and Research, Kolkata and details of their teaching and research activities.

The Indian Institutes of Science Education and Research (IISERs) were established by the Ministry of Human Resource Development (MHRD), Government of India, based on the recommendation of the Scientific Advisory Council to the Prime Minister. The first two institutes established under this initiative were IISER Kolkata and IISER Pune in 2006, followed by IISER Mohali in 2007, and IISER Bhopal and IISER Thiruvananthapuram in 2008. Each IISER is an autonomous institution and awards its own degrees. The basic mandate of the IISERs is to provide quality science education and to carry out research in basic and frontier areas of science involving both undergraduate and postgraduate students. Through borderless and flexible education programs, IISERs provide an opportunity for young students to experience the excitements of research in the sciences. In essence, IISERs are devoted to both teaching and research in an integrated manner – thus nurturing both curiosity and creativity.

IISER Kolkata's fully residential campus is coming up on 201 acres of land at Haringhata (Mohanpur). We expect the years 2013-2014 to be exciting and eventful for the growth of IISER Kolkata. The coming years would be an important landmark for us, as the Institute is planning to shift a major part of its activities to the permanent campus.

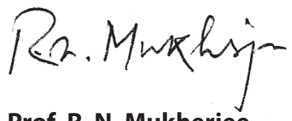
The first two batches of students who joined in 2006 and 2007 successfully completed their academic requirements for the award of BS-MS dual degree. Notably, about 80% of our first and second-batch BS-MS students, totalling 103, have booked their places in some of the world's best research institutes, including top-notch North American and European universities, in addition to joining premier research institutes in India. The third batch of students who joined in 2008 is on the verge of completion in May 2013. We are proud of the fact that, as of March 2013, a total of 14 students have completed their PhD research working at IISER Kolkata. We are excited and looking forward to awarding degrees to all three batches of BS-MS students and PhD students during the First Convocation of IISER Kolkata, scheduled in June 2013.

IISER Kolkata offers students a unique educational experience, which is comprehensive in character and rounded in nature. It also offers faculty members and students a modern and flexible environment to grow intellectually through an informal and formal exchange of ideas both within and outside the classrooms. To support continuing growth in interdisciplinary research and teaching, it is understandable that creation of an efficient academic environment is a must. Accordingly, IISER Kolkata strives to train students to become part of this dynamic and evolving scenario. Creating research infrastructure is one of our top-notch priorities. And hence we are continuing to add on to the already existing and impressive experimental facilities.

IISER Kolkata has well-trained, committed, and dedicated faculty members to take the Institute to greater heights in the coming years. Our faculty members are supported by attractive start-up and matching research grants. With 76 regular faculty, 407 BS-MS students, 57 Integrated PhD students, 177 PhD students, and 2 Post-Doctoral Fellows, IISER Kolkata is vibrant with academic activities. It is a matter of great satisfaction that faculty members have been publishing their research papers in journals of international repute, based on work done at IISER Kolkata. Some of our young faculty members have excelled in research and have been recognized with national and international fellowships and awards. It is very satisfying to put on record that our colleagues have attracted funding through 76 sponsored research projects amounting to about Rs. 32 Crores. Moreover, the academic activities of IISER Kolkata are supported by 53 non-teaching staff members.

Apart from engaging in scientific activities, students and faculty of IISER Kolkata are also involved in various social and outreach activities. We are trying our best to fulfil our social commitment through various outreach programmes. The institute plans to develop a synergetic network with other academic institutions both in India and abroad, addressing fundamental issues related to science education in India.

To conclude, for inquisitive young minds looking for a platform to experience a fine blend of quality teaching and world-class research in basic sciences and for young faculty candidates keen to get an opportunity to make a name in teaching and cutting-edge research, IISER Kolkata is one of the best institutions in India to reckon with. As I believe in collective responsibility and team efforts, I find IISER Kolkata is an ideal place to take quality faculty members and students, and non-teaching staff members along with me in this educative and satisfying journey to build, to nurture, and to see the fruits of a budding academic institute of substantial promise. Personally, I am humbled and grateful to be a part of this challenging and exciting environment of IISER Kolkata.



Prof. R. N. Mukherjee
Director

HoD's Note

Sumana Annagiri
Head of the Department
Department of
Biological Sciences

The Department of Biological Sciences at IISER Kolkata is engaged in performing research in synergy with teaching a variety of topics covering the entire gamut of biology. The Department comprises of twenty-two faculty members with diverse research backgrounds from the best laboratories in the world and in spite of being early in their career, they have received prestigious national and international fellowships and grants. Currently, more than forty PhD students, eighteen Integrated PhD students and around fifty BS-MS students are being mentored in our Department.

We use cell cultures, bacteria, insects, fish, mice, dogs and plants as our model systems to explore outstanding issues ranging from the molecular basis of life to dynamics of ecosystems. In addition to basic research, we also work on socially and nationally relevant issues such as human health, disease and biodiversity.

In this relatively young Institute, our Department functions imbibing the philosophy of resource sharing. Thus we have common labs and instruments – to maximize the benefit of limited resources and to encourage interactions across different disciplines. Our teaching imparts a holistic view of biology and emphasizes student involvement in research in an atmosphere that is both dynamic and interdisciplinary. Our undergraduate students participate in advanced research and indeed, some of them have research publications. In summary, we explore the mysteries of the living world and also train young minds in the joys of that exploration and it is with pleasure that I invite you to explore our world.

Academic Programs

Teaching

Our teaching of biology aims at giving students an integrated view of the subject equipping them for a career in research. We introduce biology on premises taken from traditional topics like botany, zoology and physiology and also bring in more modern fields like genetics, molecular biology, microbiology and neurobiology. Subsequently we zoom out to organismal biology, ecology and evolution. The intersection of biology with other subjects like chemistry and physics is dealt with in courses such as biochemistry, chemical pathways in biology and biophysics, and structural biology. Courses that explain the scientific methodology and basic statistics are offered in order to provide a sound footing in designing experiments and analysis.

Our senior students take up more advanced courses which give them a glimpse of the latest developments in the areas of their interest and is taught by faculty who are experts in that field. Paper presentations, debates and an open door for discussions with faculty are common practice for exchanging information and ideas between our students and faculty. This policy helps our students overcome any inhibition that they may have in order to think and reason rather than merely listen and remember.

Given that biology is largely experimental in nature, it is essential to learn the skills to handle different tools and understand the principles on which these function. In our laboratory classes we have small batch sizes and extended contact hours with the faculty to ensure a quality experience. Several experimental techniques from biochemistry, molecular biology, tissue culture, biophysics and behavioral observations are taught in conjunction with the theory courses that students take in a given semester. We are supported in our laboratory teaching by dedicated staff members – Debabrata Sutradhar, Sudhanshu Maity and Sudip Mitra. Practical classes for some courses like behavior, ecology and evolution involve field trips and utilization of our large, biologically rich campus, as a natural laboratory. Several practical courses and project works that students take up, initiate students into the methodologies of science. This involves thinking about a good question, designing experiments and conducting them to answer that question with appropriate analysis, writing up a research report and making a presentation where they have to defend their work in front of their peers and faculty members.

We offer undergraduate, postgraduate and pre-doctoral programs for our students who come with diverse backgrounds and from different parts of the country. The aim of our teaching programs is to infuse an appreciation of the field of biology in young minds at an early stage and to impart a thorough training in all disciplines of biosciences when they are in their advanced stages of coursework. In each of these programs we offer our students an appropriate mix of core topics which are deemed essential and additional options on courses that are specialized and cross the traditional boundaries of teaching and research. Indeed, students majoring in Biology also get a chance to take up courses in Mathematics, Physics, Chemistry and Earth Sciences. We expect that a seamless integration of learning within Biology with other fundamental sciences will prepare our students for a successful research career in both traditional as well as in emerging interdisciplinary areas of biology.

Integrated BS-MS Program

Students who have acquired a Plus II degree are eligible for this program. Along with Biology, students take Mathematics, Physics, Chemistry and Earth Science courses in the first two years following which they choose to major in a discipline and select minor courses from other disciplines. Biology majors go through a set of courses which are designed to provide a thorough training at par with global standards. In their fifth and final year they perform a research project which is the basis of their Master's thesis. These students enjoy a scholarship, live on campus with a vibrant life. Currently we have thirty-seven students majoring in Biology. Our first two batches of students have done quite well after graduation and most of them are now pursuing a PhD degree in reputed universities.

Integrated PhD Program

The Integrated PhD program is for students who have completed their Bachelor's degree. The first two years require them to undergo a formal coursework which is a mix of core and elective courses. While working towards completing their credit requirement they also perform a research project in their second year. On successfully negotiating a comprehensive exam they subsequently enroll for a PhD degree at the Institute. Integrated PhD students receive a scholarship and get to live on campus. Currently we have eighteen IPhD students in Biology.

PhD Program

Students with a Masters degree and satisfying certain other prescribed criteria are eligible for our Doctoral program. They undertake course work and laboratory rotations initially to get a feel for diverse research opportunities offered in our Department, following which they start their research work. They receive scholarships as per prescribed norms from Government agencies such as CSIR, DBT or ICMR or from the Institute. In addition a research contingency is granted to allow for academic related expenses such as conference travel and books. Currently we have more than forty research scholars pursing their PhD in Biology.

Postdoctoral Research Program

A small number of Departmental and project funded Postdoctoral fellows constitute this pool. They are encouraged to carry out interdisciplinary research work and get exposure to teaching based on their interests. We currently have four Postdoctoral fellows in our Department.

BS-MS Courses

1st Year

Introduction to Biology I
Biology Lab I
Introduction to Biology II
Biology Lab II

2nd Year

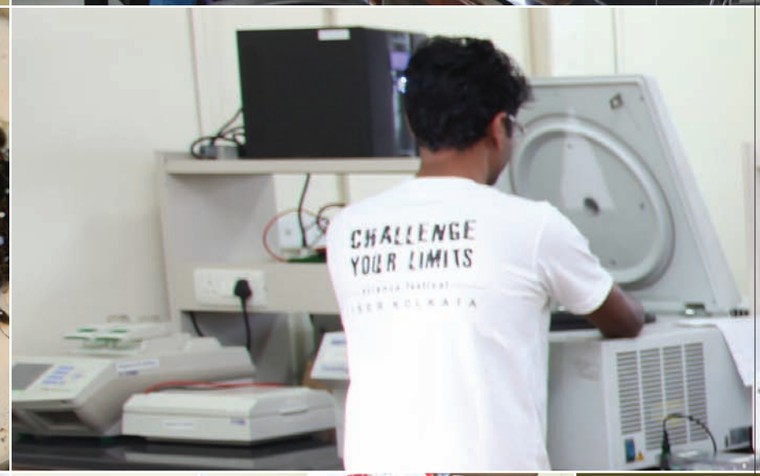
Biochemistry
Introductory Biophysics
Biology Lab III
Evolutionary Biology
Molecular Genetics
Biology Lab IV

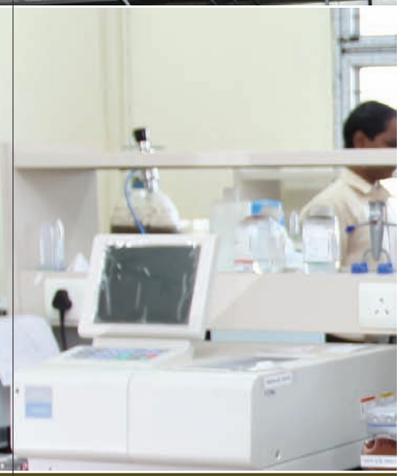
3rd Year, 4th Year

Cell Biology
Physiology
Microbiology
Plant Biology
Gene Regulation and Cellular Communication
Developmental Biology
Principles of Ecology and Conservation
Immunology
Advanced Biochemistry and Cellular Metabolism
Structural Biology
Biostatistics
Biophysics II
Neurobiology
Bioinformatics
Behavioral Biology
Systems Biology
Applied Biochemistry
Cancer Biology
Cognition
Marine Biology
Biology Labs: V-X

5th Year

Seminar and Scientific Presentation
MS Project


CHALLENGE
YOUR LIMITS



Research

Research in the Department of Biological Sciences aspires to study Biology in its full expanse with a simple connecting theme: what makes life tick? From genes to networks, animal behavior to ecosystems, we study life at all scales, in the full glory of its details, its complexities, and stochasticity. Taking reductionist to holistic approaches, using bacteria, protozoa, human cells, stem cells, plants, fruitflies, zebrafish, ants, mice, dogs or forests, we ask questions founded on a basic curiosity about living systems. With equal fervor we study, investigate and research on human health and disease, specifically motivated to develop tools to understand and treat disease conditions.

To elaborate, some of us study and design the usage of structure-functions relationships at nano-scales and some work on understanding regulation of cellular functions by macromolecular, cell-cell, cell-pathogen and cell-environment interactions. Some explore the cause and effect of emergent properties in systems in general and under stress while networks and cognition are of interest too. Some study animal behavior, its evolution and regulation. Some explore the world of wildlife conservation and address issues pertaining to climate change. Besides indoor and field experiments and working *in vitro*, *ex vivo* and *in vivo*, we do theoretical and in silico studies – modeling molecular and cellular responses, systems and networks.

In short, research at DBS covers animal behavior, biodiversity, cell and molecular biology, conservation biology, developmental biology, ecology, evolution, genetics, immunology, systems biology, marine biology, microbiology, neurobiology, plant biology, physiology, population biology, structural biology, biophysics and their various combinations.

The details of each of our research interests are explained in the following pages. The organization, seemingly random, has a motive - to try to capture life from biomolecules to biomes.

Rituparna Sinha Roy : Biomolecular engineering and nanobiotechnology.

Partha Pratim Datta: Molecular biology, stress response, translational regulation, ribosome-factors interplay, assembly.

Supratim Datta : Biochemical engineering, biophysical chemistry.

Tapas Kumar Sengupta : Cancer biology, bacterial bioremediation.

Sankar Maiti : Actin cytoskeleton dynamics during development and pathogenesis.

Shree Prakash Pandey : Small-RNA-mediated gene regulation during stress, adaptation, systems biology, molecular ecology of plants.

Rumi De : Theoretical biological physics, mechano-biology, and nonlinear dynamics.

Bidisha Sinha : Cell biophysics.

Rupak Datta : Understanding the role of lysosome in human health and diseases.

Partho Sarothi Ray : Translation control in inflammation and cancer, molecular evolution.

Anirban Banerjee : Graphs and networks: eigenvalues of graph, structure and evolution of real networks.

Jaysri Das Sarma : Neurovirology, neuroimmunology and neurobiology of diseases.

Anandamohan Ghosh : Nonlinear dynamics; mathematical and theoretical biology.

Koel Das : Exploring cognitive neuroscience using computational tools.

Malancha Ta : Stem cell biology.

Mohit Prasad : Understanding the molecular basis of collective cell movement.

Punyasloke Bhadury : Marine microbiology, climate change and ocean acidification, microbial ecology.

Sumana Annagiri : Behavioral biology.

Anindita Bhadra : Animal behavior and ecology.

Anuradha Bhat : Ecology and behavior of freshwater fish and biodiversity.

Guha Dharmarajan: Population biology and disease ecology.

Robert John Chandran : Community and ecosystem ecology, restoration ecology, biodiversity conservation, wildlife habitat management.

Rituparna Sinha Roy

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Biomolecular Engineering and Nanobiotechnology

Biomolecular Engineering with tailored functionality and structure can be harnessed as new tools to explore biology and medicine. This approach can potentially raise the very fundamental question whether Darwinian evolution has optimized the functions of existing proteins? Can such nature-inspired molecular carpentry improve our ability to engineer clinically important protein with superior activity and better stability? The key focus of our group is to exploit the tools and concepts of chemistry to understand biological problem at molecular level. We aim to explore several approaches to engineer nature inspired protein and peptide based therapeutic molecules with better thermal and proteolytic stability and comparable biological activity with natural ones. In addition, we are using nanobiotechnology approach to formulate therapeutic molecules for translating basic research into clinical applications. Potential applications range from improved peptides that exert increased angiogenic effects, especially when merged with nanotechnology, to faster clotting of blood, to very basic studies of using peptide based detergents as a new approach for membrane protein studies.

Selected Publications

- **Roy, R. S.**, Roy, B. & Sengupta, S. (2011). Emerging technologies for enabling proangiogenic therapy. *Nanotechnology* **22**, 494004. [review paper as co-corresponding author from IISER Kolkata].
- **Sinha Roy, R.**, Soni, S., Harfouche, R., Vasudevan, P. R., Holmes, O., de Jonge, H., Rowe, A., Paraskar, A., Hentschel, D. M., Chirgadze, D., Blundell, T. L., Gherardi, E., Mashelkar, R. A. & Sengupta, S. (2010). Coupling growth-factor engineering with nanotechnology for therapeutic angiogenesis. *Proc Natl Acad Sci U S A* **107**, 13608-13.
- **Roy, R. S.**, Karle, I. L., Raghothama, S. & Balaram, P. (2004). Alpha,beta hybrid peptides: a polypeptide helix with a central segment containing two consecutive beta-amino acid residues. *Proc Natl Acad Sci U S A* **101**, 16478-82.

Students Supervised

MS Student: Pratik Kumar; PhD Students: Chiranjit Dutta, Nirbhay Kumar Bhadani, Snehasish Ghosh

Personal Profile

PhD, Molecular Biophysics Unit, Indian Institute of Science, Bangalore (2005); Postdoctoral research associate at the Department of Molecular Biology ,The Scripps Research Institute, San Diego (2005-2007); Postdoctoral research fellow at the Department of Medicine, Harvard Medical School, Brigham and Women's Hospital and Harvard-MIT Division of Health Sciences and Technology (2007-2011); Assistant Professor at DBS, IISER Kolkata (since 2011); Adjunct Faculty at: Department of Chemical Sciences, IISER Kolkata. Awards: Ramalingaswamy Fellowship, Postdoctoral scientist award (ASPET, 2009, USA) and Travel award (ASPET, 2010, USA), Shamrao Kaikini Medal Best Thesis award in Chemistry and Biology, IISc, Bangalore (2005); Patent: Inducing Angiogenesis (US Provisional Application no. 61306768). External Funding: Ramalingaswamy Fellowship (2011); CSIR (2012).

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Partha Pratim Datta

Assistant Professor
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Molecular Biology, Stress Response, Translational Regulation, Ribosome-Factors Interplay, Assembly

My lab works on the mechanisms of translation regulation using microbiology, molecular biology, biochemistry, cryo-Electron Microscopy, image processing, and computation methods. The broad question we are addressing is how does ribosome function, especially, during different fluctuating natural environmental conditions? We are trying to identify the molecular basis of such activity. From these studies we prepare various functional complexes and study them by cryo-EM and image processing methods. Results from the analyses of those complexes give insights into the complex structural organization and reveal the mode of action of those factors along with the ribosomes. Moreover, we are following the structural changes of those factors in their different functional states by molecular dynamics simulations. We also work on the process of ribosome assembly by structural and biochemical means. We are working on some related essential factors that may be used as potential drug targets.

Selected Publications

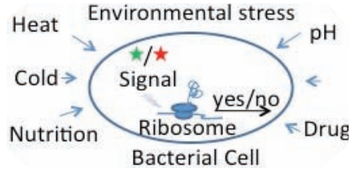
- **Datta, P. P.,** & Chatterjee A. (2013). A passage through the ribosome by Cryo-EM. in Biophysical approaches to translational control of gene expression", *Series: Biophysics for the Life Sciences 2013*; **1**, Springer**.**
- **Datta, P. P.**, Wilson, D. N., Kawazoe, M., Swami, N. K., Kaminishi, T., Sharma, M. R., Booth, T. M., Takemoto, C., Fucini, P., Yokoyama, S. & Agrawal, R. K. (2007). Structural aspects of RbfA action during small ribosomal subunit assembly. *Mol Cell* **28**, 434-45.
- Sharma, M. R., Koc, E. C., **Datta, P. P.**, Booth, T. M., Spremulli, L. L. & Agrawal, R. K. (2003). Structure of the mammalian mitochondrial ribosome reveals an expanded functional role for its component proteins. *Cell* **115**, 97-108.

Students Supervised

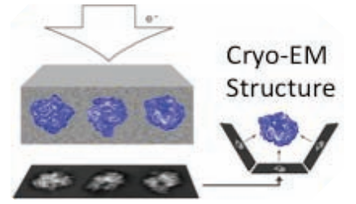
MS students: Ujani Chakrabarti, Deepau, Keertana N, Snehalata Majumder; MS-PhD student: Parijat Sarkar; PhD students: Ananya Chatterjee, Papri Kundu, Ria Biswas

Personal Profile

PhD (Molecular Biology), Indian Institute of Chemical Biology (2002); Postdoctoral researcher - Wadsworth Center, Albany, NY, USA (2001-2008); Research scientist - Wadsworth Center, Albany, NY, USA (2008-2009); Assistant Professor, IISER Kolkata, (since 2009); Awards: Robert J. Colinas Award for outstanding postdoctoral research, Wadsworth Center, USA (2007); Young Scientist Award, 5th International Conference on Molecular Epidemiology and Evolutionary Genetics of Infectious Diseases, Hyderabad, India (2000). Grant : DBT: (2011-2014).



How environmental signals are linked to translational regulation? Analyze Ribosome-Factors interplay



Studies on Translational Regulation Mechanisms.

http://www.iiserkol.ac.in/people/faculty/dbs/partha_datta

Supratim Datta

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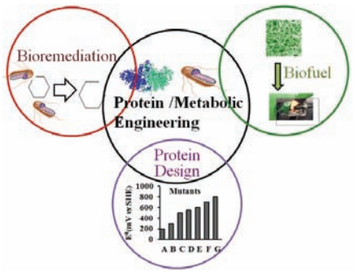
Biochemical Engineering, Biophysical Chemistry



Current Research Areas.

The Datta laboratory engineers proteins combining a synthetic biology-based approach with protein and metabolic engineering techniques for the re-engineering of enzymes and microbes. The main themes are: (a) Protein design: Metalloproteins make attractive targets for engineering protein-based molecules with useful catalytic properties. Our goal is to understand how redox potentials are fine-tuned over a broad range with little change to the redox-active site or electron-transfer properties and to re-engineer evolved metalloproteins to perform new redox chemistry. (b) Biomass degradation and Biofuels: Enzymatic hydrolysis is a rate-limiting step in the conversion of plant biomass or lignocelluloses to biofuels. The objective of our studies is to understand the synergy between the different cellulases to facilitate cellulase engineering for compatibility and function on real-world biomass. (c) Bioremediation: Bioremediation of environmental pollutants using organisms like bacteria is often a cheaper and a more permanent solution compared to the conventional techniques. Our goal is to improve the catalytic efficiency and substrate specificity of biodegradative enzymes.

Selected Publications

- Zhang, T., **Datta, S.**, Eichler, J., Ivanova, N., Axen, S., Kerfield, C., Chen, F., Kyrpides, N., Hugenholtz, P., Cheng, J-F., Sale, K.L., Simmons, B.A. & Rubin, E. (2011). Identification of Haloalkaliphilic and thermostable cellulase with improved ionic liquid tolerance. *Green Chem* **13**, 2083-90.
- **Datta, S.**, Holmes, B., Park, J. I., Chen, Z., Dibble, D., Hadi, M., Blanch, H., Simmons, B. & Sapra, R. (2010). Ionic liquid tolerant hyperthermophilic cellulases for biomass pretreatment and hydrolysis. *Green Chem* **12**, 338.
- **Datta, S.**, Koutmos, M., Pattridge, K. A., Ludwig, M. L. & Matthews, R. G. (2008). A disulfide-stabilized conformer of methionine synthase reveals an unexpected role for the histidine ligand of the cobalamin cofactor. *Proc Natl Acad Sci U S A* **105**, 4115-20.

Students Supervised

IPhD students: Priyanka Deka, Naresh Mutukula

Personal Profile

PhD, Chemistry, Boston University, Boston, USA (2005); Postdoctoral fellow, University of Michigan, Ann Arbor, Enzyme Optimization group, Joint BioEnergy Institute, Lawrence Berkeley National Lab, Emeryville, USA (2005-2011); DBT-Energy Bioscience Overseas Fellow and Assistant Professor, DBS, IISER Kolkata (since 2011). Awards: DBT-Energy Bioscience Overseas Fellow (2011); DST-Ramanujan Fellow (2011, declined) External Funding: DBT-Energy Bioscience Overseas Fellowship (2011-2016); DBT (2012-2015).

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Tapas Kumar Sengupta

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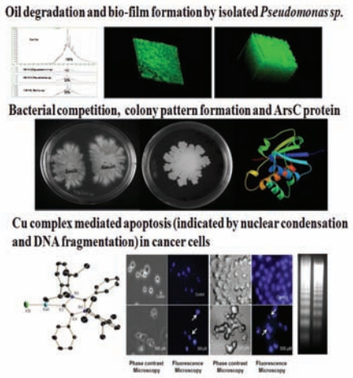
Cancer Biology, Bacterial Bioremediation



Research findings.

The broad area of our research is to understand cell behavior. Presently, through interdisciplinary collaborations, our research is focused on: (a) Molecular and behavioral characteristics of natural bacterial isolates under different growth conditions, and to translate the research findings to identify and characterize industrially and medically useful bacterial metabolites. (b) Behavior of different cancer cell lines at the levels of cellular signaling and regulation of expression of clinically important genes to find new targets for cancer therapeutics.

Selected Publications

- Banerjee, P., Soni, J., Purwar, H., Ghosh, N. & **Sengupta, T. K.** Probing the fractal pattern and organization of Bacillus thuringiensis bacteria colonies growing under different conditions using quantitative spectral light scattering polarimetry. *J Biomed Opt* (In Press).
- Dasgupta, D., Ghosh, R. & **Sengupta, T. K.** Biofilm Mediated Enhanced Crude Oil Degradation by Newly Isolated Pseudomonas Species. *ISRN Biotechnology* (In press).
- Jose, G. P., Santra, S., Mandal, S. K. & **Sengupta, T. K.** (2011). Singlet oxygen mediated DNA degradation by copper nanoparticles: potential towards cytotoxic effect on cancer cells. *J Nanobiotechnology* **9**, 9.

Students Supervised

PhD students: Debdeep Dasgupta, Brinta Chakraborty, Paromita Banerjee, Gregor P Jose, Rania Indu. Postdoctoral fellows: Dr. Anindita Das

Personal Profile

PhD (Biochemistry), University of Calcutta (1996); Postdoctoral research fellow, Department of Pediatrics, Medical University of South Carolina (MUSC), USA (1995 - 98); Research Associate, Department of Biochemistry and Molecular Biology, Medical University of South Carolina (MUSC), USA (1998 - 2004); Assistant Professor, Medical University of South Carolina (MUSC), USA (2004 - 06); Visiting Assistant Professor, DBS, IISER Kolkata, India (2006 - 2007); Assistant Professor, DBS, IISER Kolkata, India (2007 - 2010); Associate Professor, DBS, IISER Kolkata, India (since 2010); Awards: Travel award for the Annual Meeting of American Society for Biochemistry and Molecular Biology (ASBMB) (1999).

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Sankar Maiti

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Actin Cytoskeleton Dynamics during Development and Pathogenesis

Actin cytoskeleton plays an important role in cell movement and cell differentiation during development. We use biochemistry, cell biology technique to answer basic actin dynamics involved in neurite initiation, synaptogenesis, planar cell polarity and pathogenesis. Our research investigates molecular mechanisms involved in regulation and characterization of actin nucleator formin mediated actin cytoskeleton dynamics. Characterization of novel actin binding proteins is pursued in various projects involving actin cytoskeleton dynamics during development and pathogenesis: a) Molecular characterization of formin Delphilin and its role in neurite initiation and synaptogenesis. b) Expression and functions of different formins in adult mice also at different stages of developmental. c) Regulation of formin by dishevelled during developmental planar cell polarity. d) Characterization of novel actin binding protein from Entamoeba and Leishmania. e) Mechanism of actin cytoskeleton modulation by helicobacter pylori during duodenal ulcer and gastric ulcer. f) Characterization of Kaptin a novel actin binding protein.

Selected Publications

- **Maiti, S.**, Michelot, A., Gould, C., Blanchoin, L., Sokolova, O. & Goode, B. L. (2012). Structure and activity of full-length formin mDia1. *Cytoskeleton (Hoboken)* **69**, 393-405.
- Gould, C. J., **Maiti, S.**, Michelot, A., Graziano, B. R., Blanchoin, L. & Goode, B. L. (2011). The formin DAD domain plays dual roles in autoinhibition and actin nucleation. *Curr Biol* **21**, 384-90.
- Soosairajah, J.[*], **Maiti, S.**[*], Wiggan, O., Sarmiere, P., Moussi, N., Sarcevic, B., Sampath, R., Bamburg, J. R. & Bernard, O. (2005). Interplay between components of a novel LIM kinase-slingshot phosphatase complex regulates cofilin. *EMBO J* **24**, 473-86. (*Equal contribution).

Students Supervised

PhD students: Amit Das, Priyanka Dutta, Simanti Bhattacharya, Bishma Nayaran Ratha

Personal Profile

PhD, Institute of Microbial Technology, Chandigarh (2003); Postdoctoral fellow, Department of Biochemistry, Colorado State University, Fort Collins, USA (2002-2004); Research associate, Dept. of Cell Biology, The Scripps Research Institute, La Jolla, USA (2004); Postdoctoral fellow Rosenstiel Basic Medical Sciences Research Centre, Brandeis University, Waltham, USA (2004-2007); Sr. Scientist, Group leader, Cell Biology and Molecular Biology, R&D, Imgenex India Pvt. Ltd. (2007-2008); IISER fellow, IISER Kolkata (2008-2011); Assitant Professor, DBS, IISER Kolkata (since 2011); Grants: Neuroscience program of DBT (2011-2014); CSIR (2011-2014).

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Shree Prakash Pandey

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Small-RNA-mediated Gene Regulation during Stress Adaptation, Systems Biology, Molecular Ecology of Plants

Probably, the answer to the question, how is organismal complexity encoded by genomes, lies not in number of genes in an organism, rather in the regulation of gene expression including that by small-RNAs (smRNAs). We explore this hypothesis by combining systems biology, next-generation deep sequencing, experimental and field biology approaches. Current projects include: (a) The role of small-RNA pathways in plant stress adaptation during interaction with insects and microbes. (b) Understanding conceptual parallels between eukaryotic and prokaryotic small-RNA pathways. (c) The role of small-RNA pathway in regulating bacterial stress adaptation such as in *S. meliloti. and* (d) Exploring 21st generation antibiotics.

Selected Publications

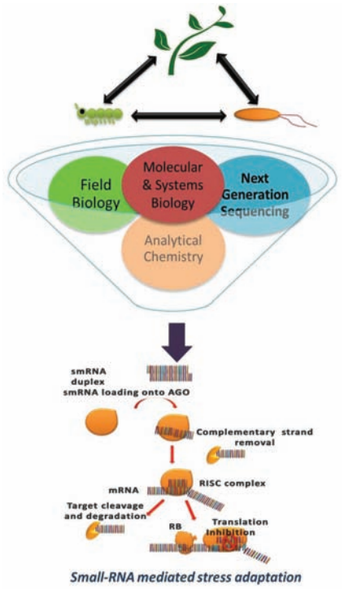
- Bozorov, T. A.[*], **Pandey, S. P.***, Dinh, S. T., Kim, S. G., Heinrich, M., Gase, K. & Baldwin, I. T. (2012). DICER-like proteins and their role in plant-herbivore interactions in Nicotiana attenuata. *J Integr Plant Biol* **54**, 189-206. ([*]Equal contribution).
- **Pandey, S. P.**, Minesinger, B. K., Kumar, J. & Walker, G. C. (2011). A highly conserved protein of unknown function in Sinorhizobium meliloti affects sRNA regulation similar to Hfq. *Nucleic Acids Res* **39**, 4691-708.
- **Pandey, S. P.**, Shahi, P., Gase, K. & Baldwin, I. T. (2008). Herbivory-induced changes in the small-RNA transcriptome and phytohormone signaling in Nicotiana attenuata. *Proc Natl Acad Sci U S A* **105**, 4559-64.

Students Supervised:

Undergrad: Gaurav Kumar Baruah, Pragya Singh; MS students: Moturu Taraka Ramji, Nidhi Sharma; PhD students: Ravi Kumar Singh; Project students: Debika Sarkar, Avinash Sethi, Bidisha Bhuyan, Divya Sahu; Postdoctoral fellows: Tirthankar Bandhopadhyay, Bornali Gohain

Personal Profile

PhD, Max Planck Institute for Chemical Ecology and FSU Jena; Postdoctoral fellow, Max Planck Institute for Plant Breeding Research, Cologne (Germany) & MIT, Cambridge (USA); Assistant Professor, DBS, IISER Kolkata (since 2011) and Head of Max Planck-India Partner Group. Awards: Otto-Hahn Medal of Max Planck Society; Life Science and Physics Award of Beutenberg-Campus Jena; *Summa cum laude* for PhD thesis; CSIR JRF-NET fellowship; GATE; DBT Scholarship (Bioinformatics); Visiting (summer) fellow of Indian Academy of Sciences. Funding: DST, Max Planck Society (Max Planck-DST Partner Program), CIMMYT, DBT.



Small-RNA mediated stress adaptation during plant-biotic interactions.

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Rumi De

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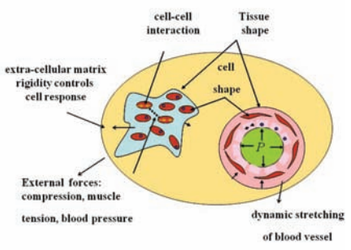
Theoretical Biological Physics, Mechano-Biology, and Nonlinear Dynamics



Cellular Mechanosensing.

Our main interest is in theoretical biological physics specifically to understand the nonlinear dynamics and the mechano-sensitive behavior of active cells. Understanding the active response of cells to mechanical forces is important in the context of many biological processes - such as wound healing, muscle growth, tissue organization and development - that have wide implication in cell biology and even in biomedical applications. Some of the areas that we are interested in include cell adhesion, orientation, actin cytoskeletal dynamics, collective cell migration, fingering instability during wound healing, and other stretch induced cellular functionality and its consequences in embryonic development. We are also interested in stick-slip dynamics of living matter such as saltatory motion of white blood cells and actin dynamics. We study the underlying physics of the concerted active responses of the cell by using the approaches of statistical physics, soft condensed matter theory, theory of elasticity, and non linear dynamics. Our group is developing suitable theoretical models as well as carrying out simulations to understand the underlying dynamics of living system.

Selected Publications

- **De, R.**, Zemel, A. & Safran, S. A. (2011). Mechanical consequences of cellular force generation. *Curr Opin in Mat Sci Solid State Phys* **15**, 169-76.
- **De, R.**, Zemel, A. & Safran, S. A. (2010). Theoretical concepts and models of cellular mechanosensing. *Methods Cell Biol* **98**, 143-75.
- **De, R.**, Zemel, A. & Safran, S. A. (2007). Dynamics of cell orientation. *Nat Phys* **3**, 655-69. (Appeared in News and Views of Nature Physics, 2007)

Personal Profile

PhD, 'Nonlinear Dynamical Systems', Indian Institute of Science (2006); Postdoctoral fellow, Weizmann Institute of Science, Israel; Postdoctoral research associate at Brown University in USA; Assistant Professor, Department of Physical Sceinces, IISER Kolkata (since 2010); Adjunct faculty at DBS, IISER Kolkata. Awards: Recipient of 'Young Investigator Award' at 6th World Congress of Biomechanics in Singapore in 2010.

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Bidisha Sinha

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Cell Biophysics

Sensing and responding to external forces is a fundamental function of the cell-interface – plasma membrane and cortical cytoskeleton. Surface area regulation (SAR) is the process by which cells are believed to regulate the plasma membrane's fluctuations or the membrane tension. Cells create 'membrane tension homeostasis' by responding to changes from the 'tension set-point' by adding or removing membrane by endo/exocytosis or other mechanisms. While mechanosensitive SAR is proposed as a 'module' in the working of the cell, and could have very diverse roles, the hypothesis depends heavily on the cell 'sensing' the membrane tension deviation. My lab aims to understand this very basis of SAR. How do cells sense tension deviation? How do micron-scale events like exo/endocytosis, membrane-cytoskeleton attachment, membrane-matrix connection etc. alter the local tension? How is it equilibriated? How does the frequency of external mechanical perturbation correlate with mechanism of SAR? We are currently developing various imaging and cell-stretching based tools to map the tension of the basal membrane of adherent cells under normal and stretched conditions.

Selected Publications

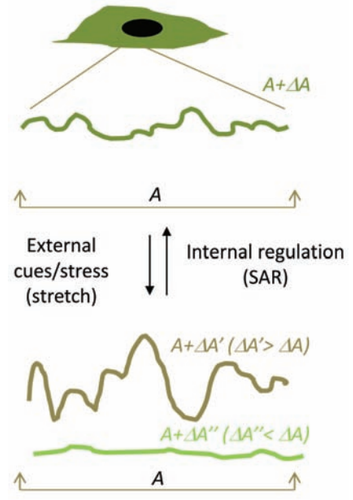
- **Sinha, B.**[*], Koster, D.[*], Ruez, R., Gonnord, P., Bastiani, M., Abankwa, D., Stan, R. V., Butler-Browne, G., Vedie, B., Johannes, L., Morone, N., Parton, R. G., Raposo, G., Sens, P., Lamaze, C. & Nassoy, P. (2011). Cells respond to mechanical stress by rapid disassembly of caveolae. *Cell* **144**, 402-13. ([*]Equal contribution).
- **Sinha, B.**, Bhattacharya, D., Sinha, D. K., Talwar, S., Maharana, S., Gupta, S. & Shivashankar, G. V. (2010). Dynamic organization of chromatin assembly and transcription factories in living cells. *Methods Cell Biol* **98**, 57-78.

Students Supervised

PhD student: Rinku Kumar

Personal Profile

PhD, National Centre for Biological Sciences - TIFR, Bangalore, India (2007); Postdoctoral fellow, Institut Curie (2007-2011), Paris, France; Assistant Professor, IISER Kolkata (since 2011). Awards: Ramanujan Fellowship (2011).



Cell Membrane homeostasis is the homeostasis of the excess membrane surface area A coming from undulations or fluctuations. Regulation of A /A is also termed as surface area regulation (SAR).

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Rupak Datta

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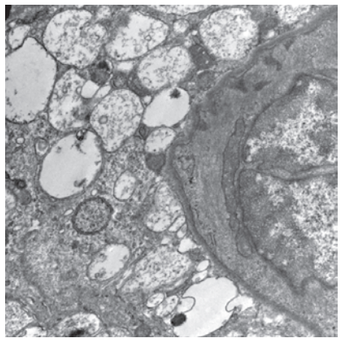
Understanding the Role of Lysosome in Human Health and Diseases



An electron micrograph showing accumulation of autophagic vacuoles in MPS VII mice brain.

Lysosomes are cell's waste disposal system, containing a battery of enzymes required for degradation of various macromolecules and cellular debris into reusable forms. In so doing lysosomes play vital roles in maintaining cellular homeostasis. Broad goal of our research is to understand the role of this fascinating organelle in human health and diseases. We are currently focused on the following two areas: (a) Investigate the pathogenesis of mucopolysaccharidoses, a group of genetic disorders caused by deficiency of the lysosomal enzymes required for stepwise degradation of glycosaminoglycans. Genetic causes of these diseases despite being known, pathways leading from lysosomal storage to cellular dysfunction/death are still unclear. We address this unresolved issue using well-characterized cell and mouse models. We are also trying to develop drosophila models of these diseases. (b) Understand how certain intracellular pathogens utilize lysosomes as their replicating niche. Phagocytes use acidic and proteolytic environment of the lysosome to destroy engulfed pathogens. But some pathogens are smart enough to be able to survive and even replicate in such harsh conditions. Using *Leishmania* infection models we ask: (a) how the pathogen tolerates acidic lysosomal pH and (b) how replicating parasites compete with the host for acquisition of essential micronutrients e.g. iron.

Selected Publications

- **Datta, R.**, Shah, G. N., Rubbelke, T. S., Waheed, A., Rauchman, M., Goodman, A. G., Katze, M. G. & Sly, W. S. (2010). Progressive renal injury from transgenic expression of human carbonic anhydrase IV folding mutants is enhanced by deficiency of p58IPK. *Proc Natl Acad Sci U S A* **107**, 6448-52.
- **Datta, R.**, Waheed, A., Bonapace, G., Shah, G. N. & Sly, W. S. (2009). Pathogenesis of retinitis pigmentosa associated with apoptosis-inducing mutations in carbonic anhydrase IV. *Proc Natl Acad Sci U S A* **106**, 3437-42.
- **Datta, R.**, Waheed, A., Shah, G. N. & Sly, W. S. (2007). Signal sequence mutation in autosomal dominant form of hypoparathyroidism induces apoptosis that is corrected by a chemical chaperone. *Proc Natl Acad Sci U S A* **104**, 19989-94.

Students Supervised

MS student: Bappa Shona Baroi; PhD students: Sudipta Bar, Dhiman Sankar Pal; Project Fellow: Indrani Basu; Visiting scholar: Dipon Kumar Mondal; Research Assistant : Sujoy Bose.

Personal Profile

PhD, Indian Institute of Chemical Biology (2000-2006); Postdoctoral fellow at Saint Louis University, Saint Louis, USA (2006-2010); Assistant Professor, IISER Kolkata (since 2010). Awards: International Congress of Human Genetics Young Investigator Award, Montreal, Canada (2011); Ramalingaswami Fellowship (DBT, 2011); Travel award, Protein Mis-folding and Mis-processing in Disease meeting, Bethesda, USA (2009); American Society of Human Genetics Postdoctoral Presentation Award, 57th Annual Meeting, San Diego, USA (2007); Best speaker award, Leishmania journal club seminar series, Indian Institute of Chemical Biology (2005).

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Partho Sarothi Ray

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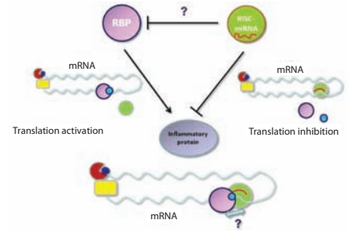
Translation Control in Inflammation and Cancer, Molecular Evolution

Our research interest is focused on the role of RNA-protein and RNA-microRNA interactions in the regulation of protein synthesis, specifically of proteins involved in inflammation and cancer. Inflammation is the primary protective response of the body to infection and injury; however unresolved inflammation is the cause or consequence of major human diseases such as cancer, atherosclerosis, arthritis and Alzheimer's disease. The mechanism of onset of inflammation is widely studied, however very little is known about the processes that resolve inflammation. Post-transcriptional regulation of multiple inflammatory proteins, involving inhibition of translation or mRNA destabilization, plays an important role in inflammation resolution. We are investigating whether the signal-dependent interactions of specific regulatory proteins with sequence/structural elements in the 3'UTR of mRNAs modulate specific miRNA-mRNA interactions, and *vice versa*, resulting in fine-tuned control of translation of inflammatory mRNAs. We are further investigating the role of RNA conformational switches in mediating this crosstalk.



Interplay between interactions of RNA-binding proteins (RBP) and microRNAs with target mRNAs in the translational regulation of inflammatory genes.

Selected Publications

- Yao, P., Potdar, A. A., Arif, A., **Ray, P. S.**, Mukhopadhyay, R., Willard, B., Xu, Y., Yan, J., Saidel, G. M. & Fox, P. L. (2012). Coding region polyadenylation generates a truncated tRNA synthetase that counters translation repression. *Cell* **149**, 88-100.
- **Ray, P. S.**, Sullivan, J. C., Jia, J., Francis, J., Finnerty, J. R. & Fox, P. L. (2011). Evolution of function of a fused metazoan tRNA synthetase. *Mol Biol Evol* **28**, 437-47.
- **Ray, P. S.**, Jia, J., Yao, P., Majumder, M., Hatzoglou, M. & Fox, P. L. (2009). A stress-responsive RNA switch regulates VEGFA expression. *Nature* **457**, 915-9.

Students Supervised :

MS students: Ashish Goyal; PhD students: Dipak Kumar Poria, Monalisa Mandal, Deepika Ahuja; IPhD: Vasundhara Sharma, Abhishek Guha

Personal Profile

PhD, Department of Microbiology and Cell Biology, IISc., Bangalore (2005); Postdoctoral fellow, Department of Cell Biology, Lerner Research Institute, Cleveland Clinic, Cleveland, Ohio (2004-2008); Assistant Professor, IISER Kolkata (since 2008). Awards: Associate, Indian Academy of Sciences (2010); F. Merlin Bumpus Scientist of the Year Award (2007) from the Lerner Research Institute, Cleveland Clinic; Sreenivasaya Medal, (2004-2005), for the best PhD thesis from the Department of Microbiology and Cell Biology, IISc., Bangalore; Patents: for "A synthetic RNA to target IRES-mediated translation of Viral RNA" by P. S. Ray and S. Das, IISc., Bangalore. Grants: DBT-Wellcome Trust India Alliance Intermediate Fellowship, (2011-2016).

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Anirban Banerjee

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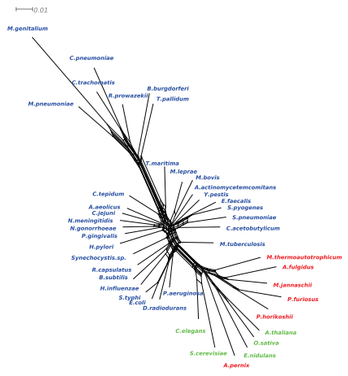
Graphs and Networks: Eigenvalues of Graph, Structure and Evolution of Real Networks



The splits networks constructed from normalized graph Laplacian spectral distance between metabolic-centric networks of 43 species.

It is a basic question in biology and other fields to identify the characteristic properties that on one hand are shared by structures from a particular realm, like gene regulation, protein-protein interaction, neural networks or food-webs, and that on the other hand distinguish them from other structures. Existing graph measures can retrieve certain structural information, but are not sufficient to capture all aspects of a network. Anirban is developing a tool, spectra of normalized graph Laplacian that helps to understand the network structure with deep perception. He is exploring how evolution of a network with different graph operations produces specific eigenvalues and how useful hypotheses about evolutionary processes can be made by investigating the spectra of real networks. Applying a meaningful distance measure, Anirban shows that network structures are more similar within the same class than between classes and the evolutionary relationship between the networks can be elucidated from their structural differences. He also investigates the changes in connectivity of human brain functional networks constructed from the episodic and working memory tasks in aging.

Selected Publications

- Matthaus, F., Schmidt, J. P., **Banerjee, A.,** Schulze, T. G., Demirakca, T. & Diener, C. (2012). Effects of age on the structure of functional connectivity networks during episodic and working memory demand. *Brain Connect* **2**, 113-24.
- **Banerjee, A.** (2012). Structural distance and evolutionary relationship of networks. *Biosystems* **107**, 186-96.
- **Banerjee,A.** and Jost., J. (2009). Graph spectra as a systematic tool in computational biology. *Discrete Applied Mathematics* **157**, 2425-31.

Students Supervised :

MS Students: Shashankaditya Upadhyay, Pallabi Sengupta; PhD Students: Krishanu Deyasi, Ranjit Mehatari

Personal Profile

PhD, Max-Planck Institute for Mathematics in the Sciences, Germany (2008); Postdoctoral fellow, Max-Planck Institute for Molecular Genetics, Germany (2008-2010); Assistant Professor, IISER Kolkata, Department of Mathematics and Statistics (since 2010); Adjunct faculty at DBS, IISER Kolkata.

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Jayasri Das Sarma

Associate Professor
dassarmaj@iiserkol.ac.in

Neurovirology, Neuroimmunology and Neurobiology of Diseases

Demyelination is the process by which axons lose their normal insulating myelin. Myelin forms an insulating sheath surrounding axons in the central and peripheral nervous systems and is essential for rapid propagation of neuronal action potentials. My laboratory is involved in the study of neuropathogenesis of murine Coronavirus, mouse hepatitis virus (MHV) infection in mice which causes central nervous system (CNS) *demyelination* and consecutive axonal loss which mimics certain pathology of human neurological disease Multiple Sclerosis (MS). We have reverse genetic systems of MHV to generate a battery of recombinant strains and we have the important tools of a well developed animal model system to elucidate the cellular and molecular details of neuroinflammatory cascade of the demyelination. Our long term goal is to extend these studies to search for similarities in mechanistic pathways of the inflammatory processes associated with other neuro-infectious diseases to meet the challenge of future emerging neurotropic viruses and viral diseases.

Selected Publications

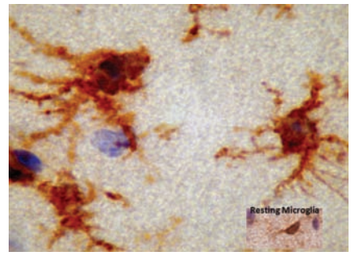
- **Das Sarma, J.**, Kenyon, L. C., Hingley, S. T. & Shindler, K. S. (2009). Mechanisms of primary axonal damage in a viral model of multiple sclerosis. *J Neurosci* **29**, 10272-80.
- **Das Sarma, J.** (2010). A mechanism of virus-induced demyelination. *Interdiscip Perspect Infect Dis* **2010**, 109239.
- Shindler, K. S., Chatterjee, D., Biswas, K., Goyal, A., Dutt, M., Nassrallah, M., Khan, R. S. & **Das Sarma, J.** (2011). Macrophage-mediated optic neuritis induced by retrograde axonal transport of spike gene recombinant mouse hepatitis virus. *J Neuropathol Exp Neurol* **70**, 470-80.

Students Supervised :

PhD students: Dhriti Chatterjee, Kaushiki Biswas, Abhinoy Kishore, Rahul Basu; Junior Research Fellows and Research Assistants: Subhajit Das Sarma, Soma Nag, Sayantan Bose, Tanmoy Dolui

Personal Profile

PhD (Biochemistry/Immunology), Jadavpur University, India, (2005); Research associate, Rockefeller Foundation Program, MRDG, IISC, Bangalore, India (1996) ; Postdoctoral fellow, University of Pennsylvania, Philadelphia, USA (1997-2000); Research associate (2001-2002); Senior research investigator (2002-2004); Assistant Professor, Thomas Jefferson University, Philadelphia, USA, (2004- 2008); Assistant Professor , IISER Kolkata (since 2008). Awards and honors: Advanced postdoctoral fellowship award, National Multiple Sclerosis Society, USA (2001); Dale McFarlin Award – National Multiple Sclerosis Society, USA (2002); Young scientist travel grant – IXth International Symposium of Nidoviruses, Netherlands (2003); Lindback Distinguished Teaching Award, Junior Faculty Career Enhancement Award, USA (2007); Science Horizon Research Internships-Mentor Award, Bryn Mawr College, USA (2007); American Society for Microbiology Indo-US Research Professorship (2013); Adjunct faculty at Department of Neurology, Thomas Jefferson University, Philadelphia, USA; Adjunct Associate Professor: Department of Ophthalmology, University of Pennsylvania, Philadelphia, USA.



Activated microglia present during acute infection of mouse with demyelinating strain of mouse hepatitis virus (MHV).

Brain section from demyelinating strain of MHV infected mouse at day 7 post infection was immunostained for Iba-1 (Ionized calcium binding protein; maker for activated microglia/macrophage). Immunostaining shows the microglial activation during acute stage of MHV infection. Inset shows the resting microglia in non infected control mouse brain section. Original magnification is 1000X.

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Anandamohan Ghosh

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Nonlinear Dynamics; Mathematical and Theoretical Biology

$$\frac{d\varphi_i}{dt} = u_i(\varphi_i)$$

I work on understanding the biological systems from a nonlinear dynamics and a statistical physics perspective. Dynamics of a neuron is highly non-linear and the methods of dynamical systems often reveal the underlying mechanism. Again, the emergence of the coherent behavior in a population of neurons can be studied using the tools of statistical physics. Identifying the features of the neural dynamics necessary for the emergent sensory adaptation is one of my present research interests. The mathematical analysis used in the above studies are quite generic in the sense that they can be used to study many biological systems. I also study the role of intrinsic noise in the transcription dynamics and how a cell responds and adapts to changes in the environment.

Selected Publications

- So, L. H., **Ghosh, A.**, Zong, C., Sepulveda, L. A., Segev, R. & Golding, I. (2011). General properties of transcriptional time series in Escherichia coli. *Nat Genet* **43**, 554-60.
- Roy, D., **Ghosh, A.** & Jirsa, V. K. (2011). Phase description of spiking neuron networks with global electric and synaptic coupling. *Phys Rev E Stat Nonlin Soft Matter Phys* **83**, 051909.
- **Ghosh, A.**, Roy, D. & Jirsa, V. K. (2009). Simple model for bursting dynamics of neurons. *Phys Rev E Stat Nonlin Soft Matter Phys* **80**, 041930.

Students Supervised

MS Students: Gokul P M, Vineet Augustine; PhD Students: Soumen Kumar Patra

Personal Profile

PhD, Physics, National Chemical Laboratory, Pune (2004). Assistant Professor, Department of Physical Sciences, IISER Kolkata (since 2010); Adjunct faculty, DBS, IISER Kolkata.

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Koel Das

Assistant Professor
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Exploring Cognitive Neuroscience using Computational Tools

My primary research aim is to gain an understanding of human neural function in relation to cognitive and behavioral performance in real world tasks. A fundamental goal of cognitive neuroscience is to understand how the human brain processes and represents the environment and how these representations are used to guide adaptive behavior and decision making process. I am interested in applying state-of-the-art pattern recognition tools to explore the neural dynamics underlying the complex process of cognition. I am especially interested in analysis of EEG and fMRI signals, in the context of computational neuroscience.

Selected Publications

- Eckstein, M. P., **Das, K.**, Pham, B. T., Peterson, M. F., Abbey, C. K., Sy, J. L. & Giesbrecht, B. (2012). Neural decoding of collective wisdom with multi-brain computing. *Neuroimage* **59**, 94-108.
- **Das, K.**, Giesbrecht, B. & Eckstein, M. P. (2010). Predicting variations of perceptual performance across individuals from neural activity using pattern classifiers. *Neuroimage* **51**, 1425-37.
- **Das, K.**, Rizzuto, D. S. & Nenadic, Z. (2009). Mental state estimation for brain--computer interfaces. *IEEE Trans Biomed Eng* **56**, 2114-22.

Personal Profile

PhD, Electrical and Computer Engineering from University of California, Irvine (2007); Postdoctoral fellow, University of California, Santa Barbara (2007-2011); Ramalingaswami Fellowship (2011); Assistant Professor, Department of Mathematical sciences, IISER Kolkata, (since 2011); Adjunct faculty at DBS, IISER Kolkata. Awards: Ramalingaswami Fellowship (2011).

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Malancha Ta

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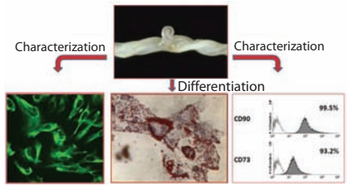
Stem Cell Biology



Characterization and differentiation of Wharton's jelly-derived mesenchymal stem cells.

Mesenchymal stem cells or multipotent stromal cells (MSCs) are adult mulitpotent cells which have been isolated from almost every type of connective tissue. Because of their multilineage differentiation capacity, immunomodulatory role and homing ability, MSC are emerging as a new therapeutic strategy for treating a variety of disorders. Although, MSCs derived from bone marrow are the best characterized, their harvest requires an invasive procedure. The umbilical cord, which is discarded at birth, can provide an inexhaustible source of stem cells for therapy. Wharton's Jelly (WJ) is the connective tissue between the umbilical cord vessels and WJ-derived MSCs possess multipotent properties between embryonic stem cells and adult stem cells. Despite important biological properties which the MSCs from different sources share, the differences between them are poorly understood. In our lab, we aim at understanding some of these differences which can be used to guide future efforts toward in vitro differentiation or cell based therapies. Some other areas of interest include modulation of culture conditions to generate tailor-made MSCs, suitable for different therapeutic applications and exploration of the possibility of reprogramming WJ-MSCs.

Selected Publications

- Balasubramanian, S., Venugopal, P., Sundarraj, S., Zakaria, Z., Majumdar, A. S. & **Ta, M.** (2011). Comparison of chemokine and receptor gene expression between Wharton's jelly and bone marrow-derived mesenchymal stromal cells. *Cytotherapy* **14**, 26-33.
- Nekanti, U., Rao, V. B., Bahirvani, A. G., Jan, M., Totey, S. & **Ta, M.** (2010). Long-term expansion and pluripotent marker array analysis of Wharton's jelly-derived mesenchymal stem cells. *Stem Cells Dev* **19**, 117-30.
- **Ta, M.**, Choi, Y., Atouf, F., Park, C. H. & Lumelsky, N. (2006). The defined combination of growth factors controls generation of long-term-replicating islet progenitor-like cells from cultures of adult mouse pancreas. *Stem Cells* **24**, 1738-49.

Students Supervised

MS Students: Tulika Sharma and Naresh Mutukula

Personal Profile

Personal Profile: PhD Life Sciences (Virology) National Institute of Immunology (NII), N. Delhi, India; Postdoctoral fellow, Diabetes Branch, NIDDK, NIH, Bethesda, MD, USA (2002-2007); Sr. Principal Scientist, Diabetes group, Stempeutics Research Pvt Ltd., Bangalore, India and adjunct Professor, Manipal Institute of Regenerative Medicine (MIRM), Bangalore, India (2008-2011); Assistant Professor, IISER Kolkata (since 2011). Awards: Fogarty International fellowship, NIH. Grants: SERC Fast Track Scheme for Young Scientists (DST) grant; SBIRI-DBT (Phase I) grant.

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Mohit Prasad

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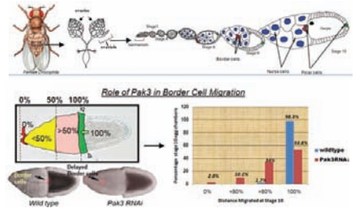
Understanding the Molecular Basis of Collective Cell Movement



Collective cell migration: in-vivo studies using fly model.

Collective cell migration is a dynamic, highly coordinated movement of cell cluster that plays an important role during development, wound healing, angiogenesis and tumor cell metastases. Although this kind of cellular movement is widespread and therapeutically relevant, the underlying mechanism by which cell groups sense direction and induce coordinated motility is far from clear. We are employing the genetically tractable model, *Drosophila melanogaster,* to get an insight into how group cell migration is mediated. We are exploiting the powerful combination of sophisticated genetic analysis coupled with live cell imaging, molecular & cell biology to identify autocrine and paracrine factors that mediate group/cohort migration. In long term, we hope that this analysis would not only improve our understanding of embryonic development and morphogenesis, but has a great potential of identifying therapeutic targets for cancer metastasis.

Selected Publications

- **Prasad, M.**, Wang, X., He, L., & Montell, D. J. (2011). Border Cell Migration: A Model System for Live Imaging and Genetic Analysis of Collective Cell Movement. *Methods Mol Biol* **769,** 277-86.
- **Prasad, M.**, Jang, A. C., Starz-Gaiano, M., Melani, M. & Montell, D.J. (2007). A protocol for culturing *Drosophila melanogaster* stage 9 egg chambers for live imaging. *Nat Protc.* **2**, 2467-73.
- **Prasad, M.** & D. Montell. (2007). Cellular and Molecular Mechanisms of Border cell migration Analyzed using time-lapse live-cell imaging. *Dev Cell* **12**, 997–1005.

Students Supervised

MS Students: Mrinal Chayengia, Arunabha Sarkar; PhD students: Aresh kumar Sahu, Aditi Sharma; Research Assistants: Mrinal Chayengia, Martina Felix

Personal Profile

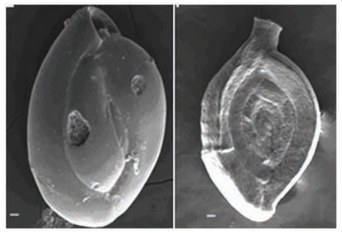
PhD, Center for Cellular & Molecular Biology (CCMB), Hyderabad, India (2005); Postdoctoral Researcher- Johns Hopkins University, School of Medicine, Baltimore, USA (2005-2009); Assistant Professor, IISER Kolkata (since 2009). Awards: Ramalingaswami Fellowship of the Department of Biotechnology (2009-2010); Best poster award at the 10th FAOBMB conference at Bangalore, India (2003); Research work selected for platform presentation at the 17th European Drosophila Research conference, Edinburgh, Scotland (2001).

http://www.iiserkol.ac.in/people/faculty/dbs/mohitprasad

Punyasloke Bhadury

Assistant Professor
pbhadury@iiserkol.ac.in

Marine Microbiology, Climate Change and Ocean Acidification, Microbial Ecology



Benthic foraminifera used as proxy to study the environmental health of Olive Ridley turtle rookeries along the Orissa coast, India.

My research is focused on understanding the diversity of coastal and deep-sea planktonic and benthic organisms based on taxonomic and molecular approaches and how biogeochemical factors can shape the distribution of these organisms across diverse marine realms. I also investigate the cellular and physiological response of marine microbial communities including photosynthetic microbial eukaryotes [e.g. phytoplankton] to ocean acidification using genomics and analytical chemistry approaches. Ongoing research projects include: (a) Barcoding Southern Ocean nematodes: an integrated approach to test hypotheses of marine nematode diversity (Funded by the Ministry of Earth Sciences, Govt. of India); (b) Study of benthos from selected sites in coastal Konkan (Funded by the Bombay Natural History Society); (c) Meiobenthic diversity studies across three Olive Ridley turtle rookeries along the coast of Orissa (Funded by DGH, Ministry of Petroleum, Govt. of India through Wildlife Institute of India, Dehradun); (c) Arsenic biogeochemical cycling in groundwater aquifers of the Bengal Delta Plains (West Bengal, India: Early detection and remediation issues (Funded by SRL, International Swedish Collaborative Scheme).

Selected Publications

- Bhattacharjee, D., Choudhury, B., Sivakumar, K., Sharma, C., John, S., Behera, S., Behera, S. & **Bhadury, P.** (2012). Benthic foraminifer assemblages in turtle congregation sites along the North East coast of India. *Journal of the Marine Biological Association of the United Kingdom* DOI:10.1017/S0025315412001440
- **Bhadury, P.**, Bik, H., Lambshead, J. D., Austen, M. C., Smerdon, G. R. & Rogers, A. D. (2011). Molecular diversity of fungal phylotypes co-amplified alongside nematodes from coastal and deep-sea marine environments. *PLoS One* **6**, e26445.
- **Bhadury, P.**, Austen, M. C., Bilton, D. T., Lambshead, P. J. D., Rogers, A. D. & Smerdon, G. R. (2006). Development and evaluation of a DNA barcoding approach for the rapid identification of nematodes. *Marine Ecology Progress Series* **320**, 1-9.

Students Supervised :

PhD students: Devanita Ghosh, Brajogopal Samanta, Priyanka Chowdhury, Sujata Roy, Debaprasad Parai, Tarakeshwar Singh; Postdoctoral Fellows: Dr. Diya Sen, Dr. Avik Kumar Choudhury and Dr. Nityananda Mondal; Junior Research Fellows and Research Assistants: Priscilla Philip, Moumita Ghosh, Pradnya Khanderao, Areen Sen and Mayukh Das

Personal Profile

PhD, Biological Sciences, Plymouth Marine Laboratory and University of Plymouth, Plymouth, UK (2005); Junior research scientist, Plymouth Marine Laboratory, Plymouth, UK (Jan 2006-Feb 2006); Postdoctoral research associate, Department of Geosciences, Princeton University, USA (Mar 2006-Sept 2008); Scientist, Wildlife Institute of India (MoEF, Govt. of India), Dehradun, India (Oct 2008- Dec 2008) Assistant Professor, DBS, IISER Kolkata (since 2009). Awards: Recipient of ISBDS travel award, MoES and YES travel award, IASC travel award; Team leader, 3rd Indian Arctic Expedition 2010 (Winter Phase) ; PML International PhD Scholarship (2002-2005).

http://www.iiserkol.ac.in/people/faculty/dbs/pbhadury

Sumana Annagiri

Assistant Professor
sumana@iiserkol.ac.in

Behavioral Biology

The biology of social insects like wasps, honeybees and ants are fascinating. They have inhabited Earth for a significantly longer period than humans and often display a social organization that rivals that of humans. Their organization and the array of methods by which they communicate facilitate efficient and cohesive action, helping them adapt to a changing environment. I seek to understand how complex interactions between social insects and their environment help them survive and evolve, and what lessons we can take from their ecological success. In my lab, we are currently involved in the first systematic study of the Indian black ant *Diacamma indicum*. Using this model system, we observe and analyze the nature of signals used by social insects, their display and perception. We explore why social insects such as ants take the risk and bear the cost of relocation, especially in the face of challenging environmental conditions such as rising temperatures and monsoon. We use behavioral observations techniques, hypothesis driven experiments and modeling as tools to unravel these mysteries of nature. In the process, we learn from these small insects about the importance of social living – lessons which may help us adapt and survive in a changing world.

Observing ant relocation at the Behavior and Ecology Field Station on campus. Colonies with individually marked ants move their entire nest (left hand bottom corner) through tandem running to their new nesting site.

Selected Publications

- **Sumana A. &** Sona C. (2013). Key relocation leaders in an Indian queenless ant. *Behavioural Processes*. In press.
- **Sumana, A.** & Sona, S. (2012). Studies on colony relocation in the Indian queenless ant *Diacamma indicum*. *Curr Sc*, **102,** 1373-74.
- Kaur R., Anoop K. & **Sumana A.** (2012). Leaders follow leaders to reunite the colony: relocation dynamics of an Indian queenless ant in its natural habitat. *Anim Behav* **83**, 1345-53.

Students Supervised

PhD students : Rajbir Kaur, Swetashree Kolay, Anoop K

Personal Profile

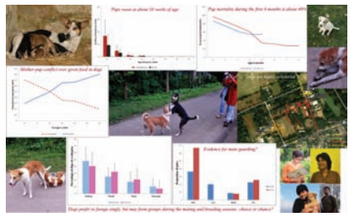
PhD, Indian Institute of Science, Bangalore, India (2002); Postdoctoral fellow, Tufts University, Boston, USA (2002-2004). Assistant Professor, IISER Kolkata (since 2008). Awards: Emerging nations award, Animal Behaviour Society and International Ethology congress USA, 2011 Grants: Animal Behavior Society, USA (2000); DST fast track grant, Govt. of India (2012).

http://www.iiserkol.ac.in/people/faculty/dbs/sumana

Anindita Bhadra

IISER Fellow
abhadra@iiserkol.ac.in

Animal Behavior and Ecology



Dog watching – glimpses from the first three years.

The dog (*Canis lupus familiaris*) is known as man's re friend, but it has rarely been studied in nature, outside human homes. However, the dog can be an interesting model system for addressing many basic questions in behavioral ecology, like territoriality, aggression, parental care, mating systems, competition, cooperation and sociality, to name a few. The question of how the dog has evolved from wolf-like ancestors to the quintessential pet is also an open debate, which can be addressed by studying dog behavior in nature. In India free-ranging or stray dogs are an essential part of human ecology, and these dogs can be easily studied. We are carrying out intense field-based studies on various aspects of dog behavior and ecology on the streets of Kolkata, Kalyani and the IISER-K campus. We hope to build an understanding of the evolution of the dog-human relationship through the ages by addressing the proximate questions related to dog behavior and ecology in nature.

Selected Publications

- Nandi, A. K., **Bhadra, A.**, Sumana, A., Deshpande, S. A. & Gadagkar, R. (2013). The evolution of complexity in social organization-A model using dominance-subordinate behavior in two social wasp species. *J Theor Biol*.
- **Bhadra, A.**, Mitra, A., Deshpande, S., Chandrashekhar, K., Naik, D. G., Hefetz, A. & Gadagkar, R. (2010). Regulation of reproduction in the primitively eusocial wasp *Ropalidia marginata*: On the trail of the Queen pheromone. *J Chem Ecol* **36**, 424-31.
- **Bhadra, A.** & Gadagkar, R. (2008). We know that the wasps 'know': cryptic successors to the queen in Ropalidia marginata. *Biol Lett* **4**, 634-7.

Students Supervised

MS students: Sayantan Das; PhD students: Manabi Paul, Anandarup Bhadra

Personal Profile

PhD (Animal Behavior), Centre for Ecological Sciences, Indian Institute of Science, Bangalore (2008); Post-doctoral research associate, Centre for Ecological Sciences, Indian Institute of Science, Bangalore (2007-2009); IISER Fellow, IISER-Kolkata (since 2009); Recent honours: INSA young scientist award in animal sciences (2009); External funding: CSIR (2010-2013), INSA young scientist grant (2010-2013).

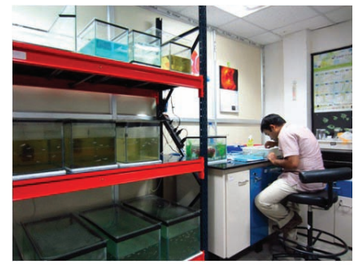
http://www.iiserkol.ac.in/people/faculty/dbs/abhadra

Anuradha Bhat

Assistant Professor
anuradhabhat@iiserkol.ac.in

Ecology and Behavior of Freshwater Fish and Biodiversity

My research focuses on ecological and behavioral studies to answer a range of questions using tropical freshwater fishes as a model system. The research themes in the lab can be classified into two broad themes: (a) Zebrafish behavior: The current research in this area involves understanding the behavioral variations and their relationships to environmental and genetic factors among natural populations of zebrafish. Other questions we are addressing include studying the ecological correlated of behavior such as aggression, shoaling, mate choice and courtship in wild zebrafish. (b) Fish Biodiversity and Conservation: Using a combination of empirical and theoretical approaches, we study environmental variables that determine species diversity and abundance among fish assemblages in tropical freshwater systems. This understanding can be used for formulating models for predicting effects of species loss from human disturbance and can be used in developing conservation prioritization plans for biodiversity rich tropical systems.



Top: Zebrafish Lab

Bottom: Fieldwork: collecting fish samples in Central Indian streams.

Selected Publications

- Whiteley, A. R., **Bhat, A.**, Martins, E. P., Mayden, R. L., Arunachalam, M., Uusi-Heikkila, S., Ahmed, A. T., Shrestha, J., Clark, M., Stemple, D. & Bernatchez, L. (2011). Population genomics of wild and laboratory zebrafish (Danio rerio). *Mol Ecol* **20**, 4259-76.
- **Bhat, A.** & Magurran, A. E. (2007). Does disturbance affect the structure of tropical fish assemblages? A test using null models. *J Fish Biol* **70**, 623-29.
- **Bhat, A.** & Magurran, A. E. (2006). Taxonomic distinctness in a linear system: a test using tropical freshwater fish assemblages. *Ecography* **29**, 104-10.

Students Supervised :

PhD students: Tamal Roy, Rohitashva Shukla

Personal Profile

PhD (Ecological Sciences), Indian Institute of Science, Bangalore, (2002); Research fellow, Botanical Institute, University of Bonn, Germany (2003); Postdoctoral research fellow, Gatty Marine Laboratory, University of St Andrews, St Andrews, UK (2004-2005); Postdoctoral research fellow, Department of Biology, Indiana University, Bloomington, USA (2006-2008); Teaching Fellow, School of Biology, University of St Andrews, St Andrews, UK (2009-2010); Assistant Professor , IISER Kolkata (since 2010). Awards: Royal Society (India) International fellowship for postdoctoral research (2004-2005); Small research grant from the Fisheries Society of the British Isles (2005-2006).

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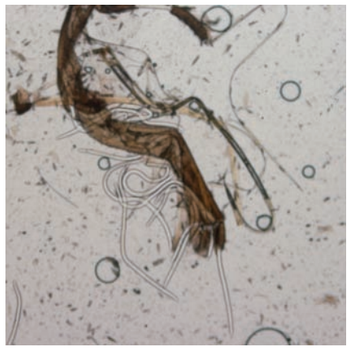
Guha Dharmarajan

Ramanujan Fellow
guha@iiserkol.ac.in

Population Biology and Disease Ecology



Infective filarial parasites in the proboscis of an Asian Tiger mosquito (Aedes albopictus).

Ranging from microscopic viruses to tapeworms measuring over 10 meters, parasites and the diseases they cause have long occupied an important place in the social and scientific domains. Despite our long fascination with parasites, however, we are only now beginning to understand how deeply they are embedded within ecological systems, an understanding of critical importance in current times when human-mediated environmental alterations – from global climate change to local habitat fragmentation – have led to modified disease dynamics and the emergence of novel pathogens or re-emergence of old ones. My research program integrates epidemiological information with data from myriad other fields – ecology, genetics, GIS and socioeconomics – through a unified framework comprised of empirical field-based research and theoretical modeling to improve our basic understanding of how parasites (from viruses to nematodes) and their vectors (from ticks to mosquitoes) affect, and are in turn affected by, ecological and evolutionary processes. Such ecological and evolutionary insights will, in the long-term, help us better manage parasites and the diseases they cause in both human and animal populations.

Selected Publications

- **Dharmarajan, G.**, Beasley, J. C. & Rhodes, O. E., Jr. (in press). Heterozygote deficits caused by a Wahlund effect: dispelling unfounded expectations. *J Wildl Manage*.
- **Dharmarajan, G.**, Beasley, J. C., Fike, J. A., Raizman, E. A., Wu, C. C., Pogranichniy, R. M. Rhodes, O. E., Jr. (2012). Disease transmission mode modulates the effects of kin-structure on disease exposure risk in wildlife populations. *Basic Appl Ecology* **13**, 560-567.
- **Dharmarajan, G.**, Beasley, J. C. & Rhodes, O. E., Jr. (2011). Heterozygote deficiencies in parasite populations: an evaluation of interrelated hypotheses in the raccoon tick, Ixodes texanus. *Heredity (Edinb)* **106**, 253-60.

Personal Profile

PhD (Population genetics), Department of Forestry and Natural Resources, Purdue University, West Lafayette, Indiana (2008); Postdoctoral research associate and member of the graduate faculty, Department of Forestry and Natural Resources, Purdue University, West Lafayette, Indiana (2008-2011); Postdoctoral visiting fellow, Laboratory of Malaria and Vector Research, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Rockville, Maryland (2011-2012); DST-Ramanujan fellow, IISER Kolkata (since 2012); Awards: funding: DST-Ramanujan Fellowship, IISER (2012-2017).

http://www.iiserkol.ac.in/people/faculty/dbs/guha

Robert John Chandran

Assistant Professor
robert.john@iiserkol.ac.in

Community and Ecosystem Ecology, Restoration Ecology, Biodiversity Conservation, Wildlife Habitat Management

I am primarily interested in understanding how life history variation among plant species influences species diversity and community structure in a wide range of ecosystems - from cold and dry sub-alpine meadows to to sub-tropical riverine grasslands to warm and wet tropical rainforests. I use basic data on plant species richness, distributions, and abundance, but also quantitative measures of species traits (e.g., demographic traits, ecophysiological traits, and reproductive traits) to evaluate the importance of deterministic (niche) and stochastic (random dispersal and drift) processes in structuring plant communities. I work independently and also in collaboration with scientists across the world in obtaining data using a range of study designs - from small quadrat samples to large permanent vegetation plots from both short-term and long-term studies. I believe that such quantitative measures of plant life histories species-rich communities is critical for scientific management and understanding ecosystem responses to global environmental change.

Riverine action at landscape-scales that maintained grassland and forest mosaics in the Eastern Terai of India have been severely altered by agricultural expansion. Successional change at play here in Manas National Park, Assam.

Selected Publications

- Baldeck, C. A., Harms, K. E., Yavitt, J. B., **John, R.**, Turner, B. L., Valencia, R., Navarrete, H., Davies, S. J., Chuyong, G. B., Kenfack, D., Thomas, D. W., Madawala, S., Gunatilleke, N., Gunatilleke, S., Bunyavejchewin, S., Kiratiprayoon, S., Yaacob, A., Supardi, M. N. & Dalling, J. W. (2013). Soil resources and topography shape local tree community structure in tropical forests. *Proc Biol Sci* **280**, 20122532.
- Zhang, H., **John, R.**, Peng, Z., Yuan, J., Chu, C., Du, G. & Zhou, S. (2012). The relationship between species richness and evenness in plant communities along a successional gradient: a study from sub-alpine meadows of the Eastern Qinghai-Tibetan Plateau, China. *PLoS One* **7**, e49024.
- **John, R.**, Dalling, J. W., Harms, K. E., Yavitt, J. B., Stallard, R. F., Mirabello, M., Hubbell, S. P., Valencia, R., Navarrete, H., Vallejo, M. & Foster, R. B. (2007). Soil nutrients influence spatial distributions of tropical tree species. *Proc Natl Acad Sci U S A* **104**, 864-9.

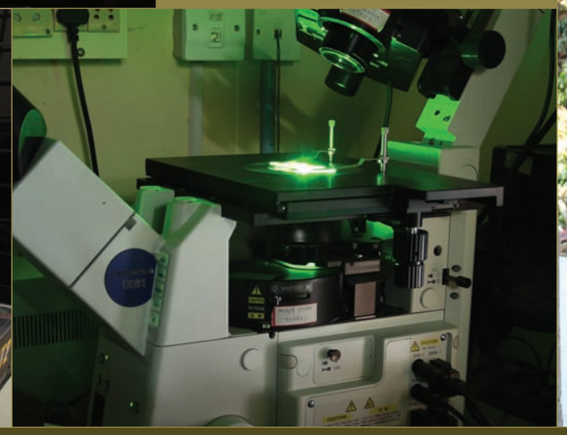
Students Supervised :

MS student: Amanpreet Kaur; PhD students: At ATREE, Bangalore: Dhritiman Das, Radhika Kanade, Shweta Basnett, Yangchenla Bhutia

Personal Profile

PhD (Tropical Forest Ecology), Indian Institute of Science, Bangalore, (2001); Postdoctoral fellow, University of Georgia, Athens, USA, Smithsonian Tropical Research Institute (STRI), USA (2002-2004); Postdoctoral fellow, University of Illinois, Urbana-Champaign, USA (2004-2006); Faculty fellow, Ashoka Trust for Research in Ecology and the Environment (ATREE) (2006-2010); Assistant Professor, IISER Kolkata (since 2010). Grants: Department of Biotechnology, Government of India; UNESCO (2008-2011); United States Fish and Wildlife Service (2012-2013); Adjunct fellow at: Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore.

http://www.iiserkol.ac.in/people/faculty/dbs/robert-john



Research Facilities

The Department houses besides all basic facilities, several advanced research equipment catering to needs of the whole institute as well as external users. Our shared facilities include the **Central Imaging Facility** comprising of a Zeiss LSM 710 confocal microscope, supported by a dedicated technician (Ritabrata Ghosh) and several Olympus IX81epifluoresence microscopes as well as SZX16 stereo fluorescence microscopes. The **Histopathology Facility** is equipped with state of the art tissue processing, embedding, microtome/cryotome based sectioning, staining instruments and microscopes. The **Flow Cytometry Facility** consists of a BD FACSCalibur flow cytometer and a BD FACSverse. and in the **Real-time Quantitative PCR Facility**, two different qPCR instruments (ABI 7500 and ABI 7500 fast) are utilized. Other facilities FPLC, HPLC, and all standard equipments for conducting molecular biology, biochemical, physiological, microbial and ecological experiments, including a Drosophila, Zebrafish, Computational Biology and NGS analysis labs and a small CPCSEA certified animal house.

In addition to indoor experimental facilities, the **Behavior and Ecology Field Station** encompassing an area of 150 x 130 m^2 is exclusively dedicated to the study of plants and animals without any anthropogenic disturbances.

BS-MS students

IPhD, PhD students

Students

Current Students

BS-MS

2010 batch

Sandipan Dasgupta
Gaurav Kumar Baruah
Sanchari Datta
Priyanka Chowdhury
Shukla Sarkar
Pragya Singh
Patil Neha Dattatray
Jasmin G. Russel
Binitha Anu Varghese
Jijimole G. R.
Smitha A. S.
Sreeparna V.
Jijumon A. S.
Praveen V. Prasad
Chinchumol K. Sabu
Swarna Prava Behera
Jayshree Deheria

2009 batch

Hemanta Sarmah
Manjusha S. Ghosh
Titas Sengupta
Abhishek Anand
Abhinav Yadav
Sumit Kumar Kar
Debtanu Chakraborty
Poonam Kumari
Trishtina Hembram
Ritama Paul
Anilisa Biswas
Praveen K.

2008 batch

Khemchand Kumar Dayal
Bappa Shona Baroi
Parijat Sarkar
Vineet Augustine
Tulika Sharma
K. Anoop
Vineeta
Pallabi Sengupta

Integrated PhD

Batch of 2009

Rania Indu (Present PhD)

Batch of 2010

Dhiman Sankar Pal
Aditi Sharma
Anandarup Bhadra

Batch of 2011

Moturu Taraka Ramji
Abhishek Guha
Bishwarup Paul
Naresh Mutukula
Arikta Biswas
Reshma Basak
Priyanka Deka

Batch of 2012

Sneha Arora
Swagata Das
Nishtha Ranawat
Madhurima Chatterjee
Shalini Singh
Sudipta Halder
Kaveri Banerjee

PhD

Debdeep Dasgupta
Brinta Chakraborty
Paromita Banerjee
Gregor P. J.
Rajbir Kaur
Dhriti Chatterjee
Kaushiki Biswas
Abhinoy Kishore
Priyanka Dutta
Amit Das
Papri Kundu
Simanti Bhattacharya
Dipak Kr. Poria
Ananya Chatterjee
Swetashree Kolay
Devanita Ghosh
Monalisa Mondal
Deepika Ahuja
Brajogopal Samanta
Tamal Roy
Rahul Basu
Sudipta Bar
Aresh Sahu
Rohitashva Shukla
Nirbhay Kumar Bhadani
Ria Biswas
Priyanka Chowdhury
Tarkeshwar Singh
Manabi Paul
Ravi Kumar Singh
Bhisma Narayan Ratha
Debaprasad Parai
Rinku Kumar
Aniruddha Das
Mazharul Abbasi
Prateek Srivastava
Praveen Kumar
Afaq Hussain

Project Research Scholars

Sujata Roy
Moumita Ghosh
Pradnya Harish Khanderao
Priscilla Philip
Subhajit Das Sarma
Anindita Das
Nityananda Mondal
Diya Sen
Ipsita Nandi
Avik Kumar Chowdhury

Alumni

Besides one PhD student who has graduated from the department, two batches of Integrated Master's (BS-MS) have also passed out. Even though many of these students had not studied Biology in their Plus II, they chose to major in Biology and are currently working for their PhD in well known national and international labs. We are proud to present the details of their pursuit in the table below.

2007 Batch

Arunabha Sarkar	PhD student	NCBS, Bangalore, India
Narendra Mukherjee	PhD student	Neuroscience Graduate Program, Brandeis University, USA
Mayukh Mondal	PhD (Bio-Medicine Dept.)	Universitat Pompeu Fabra, Barcelona, Spain
Sudipta Tung	PhD Student	Population Biology Laboratory, IISER, Pune, India
Sayantan Das	PhD student	University of Mysore, India
Jyothi V. Nair	PhD student	NCBS, Bangalore, India
Syed Zeeshan Ali	PhD student	IISER-Mohali, india

2006 Batch

Ujani Chakraborty	PhD student	Dept of Molecular Biology and Genetics, Cornell University, USA
Shubham Dipt	PhD student	Department of Network Dynamics and Molecular Neurobiology of Behavior , Max Planck Institute for Dynamics and Self-Organization, Goettingen, Germany
Salman Hasan	PhD student	Johns Hopkins University, USA
Kaushik Kant Panda	Graduate Research Associate	Dept. of Molecular Genetics, The Ohio State University, USA
C. Raghu	PhD student	Ecology and Evolution of Planktons, Stazione-Zoologica, Italy
Debashis Hira		
Mrinal Chayengia	PhD student	University of Freibourg, GERMANY
Ashish Goyal	PhD student	German Cancer Research Center (DKFZ) Heidelberg, Germany

PhD Alumni

Imroze Khan	Postdoctoral fellow	National Centre for Biological Sciences, Bangalore

Achievements of Current Students

Brajogopal Samanta (JRF)

- Participated in the multi-disciplinary Tropical Indian Ocean Cruise (SK-274) on board the National Flagship ORV Sagar Kanya, National Centre for Antarctic and Ocean Research (NCAOR), Ministry of Earth Sciences, Government of India.
- Received 3rd prize for a poster presentation, 48th Annual Convention of Indian Geophysical Union, 20th - 22nd December, 2011, Vishakhapatnam, India.

Abhinoy Kishore (JRF)

- Received S.S. Parmar Research Foundation (USA) Poster Prize – 2012, XXX Annual Meeting of Indian Academy of Neurosciences at Amritsar, 27th -30th October, 2012.

Gregor Jose (SRF)

- D. P. Burma Best poster award, 78th Annual General Body Meeting of SBC(I)- (Society of Biological Chemists, India), Pune, 30th October- 1st November, 2009.

Rahul Basu (JRF)

- Received Multiple Sclerosis International Federatiobn (MSIF) DuPre award, 2012.

Dhriti Chatterjee (SRF)

- Received Best poster award, Indian Immunological Conference 2009.

Hemanta Sarmah (BS-MS)

- Selected to be Project Oriented Biological Education fellow (POBE), JNCASR Bangalore for three consecutive summers (2010-12) and awarded a Diploma in on its completion.

Parijat Sarkar (BS-MS)

- Paper published- Gupta R. & Sarkar P. 2010, Doppler effect in circular motion, Prayas 4 (2), 23-30.
- Selected under DAAD , "Working Internships in Science and Engineering" (WISE)program. Institute- University of Potsdam, Germany under Prof. Dr. Jasmin Joshi. 2011.
- Qualified for Joint CSIR UGC NET Exam June 2012, CSIR rank 3, Life-sciences.
- Selected for SHYAMA PRASAD MUKHERJEE Fellowship (SPMF) 2012.

Anoop K (BS-MS)

- Paper published - Kaur R., Anoop K. & Sumana A. 2012 Leaders follow leaders to reunite the colony: relocation dynamics of an Indian queenless ant in its natural habitat. Animal Behaviour 83: 1345 – 1353.

Tulika Sharma (BS-MS)

- Selected for NIGINTERN summer training programme, National Institute of Genetics, Japan (2012).

Vineet Augustine (BS-MS)

- Received a research grant by Office of Naval Research, USA to study at the University of Washington, USA (2011).
- Summer Undergraduate Research Fellow (SURF) at the California Institute of Technology, Pasadena, USA (2012).
- Mitacs Globalink Fellow (University of Montreal, Canada) (2012).

Sumit Kumar Kar (BS-MS) and Sandipan Dasgupta (BS-MS)

Represented India at the fifth Asian Science Camp, 2011, Korean Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea.

Getting together

We got together with others on various occasions sharing, discussing and enjoying science.

- "Excite 2010" on 6th March, 2010, on the occasion of the National Science Day. (Convener : Anindita Bhadra).
- "Animal Behaviour Symposium" on 30th-31st October, 2010, sponsored by the three national science academies, and hosted by IISER-K. (Convener : Anindita Bhadra).
- "Frontiers in Modern Biology" in 26th-27th February, 2011. (Convener: Punyasloke Bhadury, Mohit Prasad).
- "Production of Knowledge in the Natural and Social Sciences" on 9th-10th April, 2011; a two-day CCS-IISER-K meeting. (Convener : Anindita Bhadra).
- "Sundarbans Pavilion - International Transboundary Workshop" on 13th-14th April, 2011. (Convener: Punyasloke Bhadury).
- "Kickoff workshop and meeting themed at Bioinformatics and Genomics in Agriculture, Ecology and (plant) Health", 11th-14th December, 2011. (Convener: Shree Prakash Pandey).
- "Frontiers in Modern Biology" on 4th-5th Febuary, 2012. (Convener: Rupak Datta, Partha Pratim Datta).
- "Science Academies' Refresher Course in Experimental Biology for college and University teachers", 19th-31st December, 2012; it was the first such Refresher Course in Experimental Biology and was held jointly by the three academies of science and IISER Kolkata. 18 teachers from all over India participated. (Convener : Partho Sarothi Ray).
- "1st Department Day of DBS", 6th March, 2013.

all @
Dbs.res.in

ACKNOWLEDGEMENTS

Mitali Pal, Sudhanshu Maity, IISER Nature Club
Institute's Team-Brochure: Arindam, Dibyendu, Kathakali, Parna, Saugata
DBS Team-Brochure: Anindita, Anuradha, Bidisha, Partho, Rupak, Shree, Sumana