Samik Bindu

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Department of Zoology
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ACADEMIC CREDENTIALS

- **Post Doctoral Research**
  Department of Surgery
  University of Chicago
  5841 S. Maryland Avenue
  Chicago, IL 60637, USA

- **Post Doctoral Research**
  Department of Biology II
  Biocenter of the Ludwig Maximilians University
  GroßhadernerStr 2, D-82152 Planegg-Martinsried,
  Munich, Germany, Post code 82152

- **Doctor of Philosophy (Ph.D.) in Science**
  Department of Life Science and Biotechnology, Jadavpur University, Kolkata, India
  Research conducted in Division of Infectious Diseases and Immunology
  CSIR-Indian Institute of Chemical Biology, Kolkata, India

PUBLICATION AND CITATION METRICS SUMMARY

Citation indices (Google Scholar)	
Total Citations	982
h-index	20
i10-index	22

Citation indices (ISI Web of Science)	
Total Citations	591
h-index	15
Average citations/item	23.64

HONOURS AND AWARDS

- Early Career Research Award, Department of Science & Technology, Govt. of India (2018)
- Outstanding Achievement Best Paper Award Finalist, 2017; American Physiological Society Cardiovascular Section Awards Ceremony, Experimental Biology 2018
- ASBMB 2016 Graduate/Postdoctoral Travel Award, Experimental Biology, EB2016
- Doctoral Research Fellowship, University Grants Commission (UGC), New Delhi, India.

RESEARCH INTEREST

Tissue fibrosis is a serious clinical condition associated with ageing and various other pathologies where the capacity of the organs to function optimally declines while wound healing responses go awry or unregulated to culminate into progressive deterioration. Notably fibrosis has several intricate genetic/epigenetic and lifestyle modulating underpinnings. My research interests include exploration of the molecular pathogenesis of various progressive and chronic diseases that share oxidative stress and inflammation as underlying factors with special emphasis on pulmonary fibrosis, cardiac fibrosis,

diabetic cardiomyopathy and inflammatory bowel disease (IBD). These diseases are extremely relevant in terms of Indian clinical pathological spectrum and co-incidentally involve mitochondrial pathology and chronic inflammation as etiological factors. The research activities of my lab will broadly focus on the following area:

- Understanding the contribution of mitochondrial metabolic crisis in the development of cardiac and pulmonary fibrosis with emphasis on the role of mitochondrial deacetylases as modulators of disease progression.
- Exploring the molecular basis of detrimental immunomodulation during development of chronic intestinal inflammatory diseases including Crohn's Disease and Ulcerative Colitis: involvement of mitochondrial pathology and abrogated protein quality control (PQC) machinery as potential programmers of sustained tissue inflammation.
- Exploring the contribution of mitochondrial toxicity in the pathogenesis of diabetic cardiomyopathy (DCM): identifying unique metabolic signatures associated with early undiagnosed stages of DCM by myocardial and serum metabolomics.
- Exploring the herbal treasure trove by screening natural phyto-polyphenols as well as synthetic mitochondrially targeted small molecule antioxidants to develop new generation of anti-inflammatory agents without mitochondrial toxicity unlike the available non steroidal anti-inflammatory drugs (NSAIDs).

CURRENT RESEARCH PROJECTS

- Major Research Project received as **Early Career Research Award** funded by **Science and Engineering Research Board (SERB), Department of Science and Technology, Govt. of India**; **Mechanistic studies on nuclear-mitochondrial crosstalk regulated by sirtuin-interplay in the pathogenesis of pulmonary fibrosis**; Project Allotment of **Rs. 53,38,954** for 3 years. Status: Ongoing (2019-2022)

- Major Research (R&D) Project funded by **Department of Science and Technology, Govt. of West Bengal**; **Identification and development of bio-active natural and synthetic small molecules to prevent pulmonary fibrosis**; Project Allotment of **Rs. 22.5 Lakhs** for 3 years. Sanction/Memo No.: 291(Sanc.)/ST/P/S&T/9G-35/2017; Status: Ongoing (2018-2021)

RESEARCH EXPERIENCE

Mitochondrial oxidative stress, apoptosis, pathology and repair of gastric mucosa

During my doctoral research tenure, I predominantly worked on the molecular mechanism behind injury as well as healing of the gastric mucosa post injury after treatment with Non Steroidal Anti Inflammatory Drugs (NSAIDs), popularly known as pain killers in murine models of experimental gastropathy. The work involved detailed elucidation of signaling pathways activated during NSAIDs-induced oxidative stress and consequent apoptosis in the gastric mucosa as well as the inherent cytoprotective mechanisms operating in the injured gastric mucosa with a focus on the cytoprotective enzyme hemeoxygenase-1 (HO-1) in combating NSAIDs-induced gastropathy. I specifically identified the contributing actions of mitochondrial oxidative stress (MOS)-induced tissue inflammation in eliciting gastric mucosal inflammation and that targeted induction of HO-1 in a controlled manner can prevent gastropathy besides augmenting the rate of tissue injury restoration and spontaneous healing of the wounded mucosa. Further I had explored the role of HO-1 in preventing MOS mediated inflammation in gastric mucosa upon treatment with various gastro-damaging factors like different NSAIDs, ethanol and even cold restraint stress. I had also conducted extensive mechanistic studies on the gastroprotective action of small molecule antioxidants like

Gallic acid and mitochondrially targeted novel molecule, SEGA (tryptamine-gallic acid hybrid).

Host pathogen interaction during the pathogenesis of malaria

I have also worked on host-parasite interaction in malaria wherein I explored the signaling pathways behind malaria-induced murine liver damage, identification and molecular characterization of an Alba-family protein from human malaria parasite *Plasmodium falciparum* and functional analysis of macrophage migration inhibitory factor of *Plasmodium falciparum*.

The finding were published in peer reviewed journals including ***Nucleic Acids Research*: 2012; *Journal of Biological Chemistry*: 2008, 2009, 2011, 2012; *Journal of Pineal Research*: 2009; *Free Radical Biology and Medicine*: 2013, 2012, 2011, 2010, 2009; *Infection and Immunity*: 2014**

Asymmetric cell division and regulation of developmental apoptosis in Caenorhabditis elegans

During my first post doctoral research in the Ludwig Maximilians University, I actively studied the molecular patterning and regulation of developmental apoptosis in the nematode worm *Caenorhabditis elegans*. The NSM neuroblast (NSMnb) of *C. elegans* divides asymmetrically to give rise to two cells with different sizes and fates, the NSM and the NSM sister cell (NSMsc). The NSM is larger and destined to differentiate into a serotonergic neuron while the NSMsc is smaller and programmed to die. However, the molecular mechanisms that couple asymmetric cell division and apoptosis are not well understood. CED-3 is essential for almost all programmed cell deaths in *C. elegans* development. Yet, it is unclear whether the caspase CED-3 can have any additional roles apart from its protease function. To this end, I had investigated and found that *ced-3* plays a role in setting up the cell division machinery of the NSMnb, and subsequently controls the apoptosis of the NSMsc (**Published in *Nature Communications*, 2015).** Moreover, I also investigated the segregation pattern of cellular components such as mitochondria which has not been analyzed previously during the asymmetric NSMnb division.

Sirtuin 3 and the regulation of tissue fibrosis

During my second postdoctoral research tenure in the University of Chicago, I actively explored the molecular basis of fibrotic organ damage during ageing as well as in course of chemotherapeutic drug treatment. Fibrosis is a deadly clinical condition characterized by overwhelming deposition of extracellular matrix components as a wound-healing response. Loss of regulation in the tissue-damage repair process ends up in hardening and scarring of tissues due to continuous deposition of collagen and fibronectin as a fibrotic response leading to major organ damage. The molecular pathogenesis of fibrosis is complex, multi-factorial, and poorly understood. In this regard, I investigated the role of Sirtuins in preventing pulmonary fibrosis in both animal and cell culture models. Human fibroblast cells were treated with TGFβ-1 to induce fibrosis. Sirtuin 3 is mostly referred to as the mitochondrial guardian owing to its protective role on mitochondrial metabolism. Mice, wild type as well as sirtuin knock-outs and transgenics, were subjected to bleomycin for the development of lung fibrosis. I studied and reported that SIRT3 depletion during bleomycin-induced fibrosis was associated with mitochondrial DNA damage owing to the downregulation of OGG1, major DNA glycosylase which hydrolyzes oxidized-guanine (8-Oxo-dG) to guanine. This resulted in severe damage to mitochondria in the fibrotic lungs which in turn augmented the pathological signaling leading to tissue damage and mice mortality (**Published in *American Journal of Physiology - Lung Cellular and Molecular Physiology*, 2017**). Moreover, I also explored the role of sirtuins (SIRT6, and SIRT3) in maintaining proper cardiac function in experimental cardiac fibrosis models.

In addition, I had also studied how lysine-acetylation regulates GSK3β activity to control the development of cardiac fibrosis (**Published in *Molecular and Cellular Biology*, 2015**) and how mitochondrial sirtuin (Sirt3) protects the heart from toxicity of the chemotherapeutic drug, doxorubicin, by preventing drug-induced mitochondrial DNA (mtDNA) damage via maintaining the expression of OGG1 (**Published in *American Journal of Physiology - Heart and Circulatory Physiology*, 2016**).

COMPLETE LIST OF PUBLICATIONS AND PATENTS

Publications in international peer reviewed journals

- ***During Postdoctoral Research***

  - **Review Article**

Role of sirtuins in regulating pathophysiology of the heart. Samik Bindu, Vinodkumar Pillai, and Mahesh P Gupta. **Trends in Endocrinology and Metabolism. 2016 Aug;27(8):563-73. [Impact factor: 10.769] ISSN: 1043-2760**

  - **Research Articles**

1. **SIRT3 blocks myofibroblast differentiation and pulmonary fibrosis by preventing mitochondrial DNA damage.** Samik Bindu, Vinodkumar B Pillai, Abhinav Kanwal, Sadhana Samant, Gokhan Mutlu, Eric Verdin, Nickolai O. Dulin, Mahesh P Gupta. ***American Journal of Physiology - Lung Cellular and Molecular Physiology***, **2017 Jan 1;312(1):L68-L78. [Impact Factor: 4.092], Online ISSN: 1522-1504**

2. **SIRT3 blocks aging-associated tissue fibrosis in mice by deacetylating and activating glycogen synthase kinase 3β**. Nagalingam Sundaresan*****, Samik Bindu*, Vinodkumar Pillai, Sadhana Samant, Yong Pan, Jing-Yi Huang, Madhu Gupta, Raghu Nagalingam, Donald Wolfgeher, Eric Verdin, and Mahesh Gupta. ***Molecular and Cellular Biology***, **2015 Dec 14;36(5):678-92. [Impact Factor: 3.813], Online ISSN: 1098-5549**
   * ***These authors contributed equally***

3. **Sirt3 protects mitochondrial DNA damage and blocks the development of doxorubicin-induced cardiomyopathy in mice.** Vinodkumar Pillai, Samik Bindu, Willard Sharp, Yong Fang, Gene Kim, Madhu Gupta, Sadhana Samant, and Mahesh Gupta. ***American Journal of Physiology - Heart and Circulatory Physiology***. **2016 Apr 15;310(8):H962-72. [Impact Factor: 3.569], Online ISSN: 1522-1539**

4. **Engulfment pathways promote programmed cell death by enhancing the unequal segregation of apoptotic potential.** Sayantan Chakraborty, Eric J Lambie, **Samik Bindu,** Tamara Mikeladze-Dvali and Barbara Conradt. ***Nature Communications,*** **2015 Dec 10;6:10126. [Impact Factor: 12.353], Online ISSN : 2041- 1723**

- ***During Doctoral Research, CSIR-IICB, Kolkata***

1. **Translocation of Heme Oxygenase-1 to mitochondria is a novel cytoprotective mechanism against non-steroidal anti-inflammatory drug-induced mitochondrial oxidative stress, apoptosis and gastric mucosal injury.** Samik Bindu, Chinmay Pal, Sumanta Dey, Manish Goyal, Athar Alam, Mohd. Shameel Iqbal, Shubam Dutta, Souvik Sarkar, Rahul Kumar, Pallab Maity and Uday Bandyopadhyay (**2011**) **Journal of Biological Chemistry**, 286(45):39387-402. **[Impact Factor: 4.010], Online ISSN 1083-351X**

2. **Non-steroidal anti-inflammatory drug induces proinflammatory damage in gastric mucosa through NF-κB activation and neutrophil infiltration: Antiinflammatory role of heme oxygenase-1 against non-steroidal anti-inflammatory drug.** Samik Bindu, Somnath Mazumder, Sumanta Dey, Chinmay Pal, Manish Goyal, Athar Alam, Mohd. Shameel Iqbal, Souvik Sarkar, Asim Azhar Siddiqui, Chinmoy Banerjee and Uday Bandyopadhyay (**2013**) **Free Radical Biology & Medicine**, 65:456-467. **[Impact Factor: 6.020], ISSN: 0891-5849**

3. **Gallic acid prevents nonsteroidal anti-inflammatory drug-induced gastropathy in rat by blocking oxidative stress and apoptosis.** Chinmay Pal*, **Samik Bindu***, Sumanta Dey,

Athar Alam, Manish Goyal, Mohd. Shameel Iqbal, Pallab Maity, Susanta S. Adhikari, Uday Bandyopadhyay (**2010**) **Free Radical Biology & Medicine**, 49: 258-267. **[Impact Factor: 6.020], ISSN: 0891-5849**

**** Both the authors have equally contributed***

4. **Tryptamine-gallic acid hybrid prevents non-steroidal anti-inflammatory drug-induced gastropathy: correction of mitochondrial dysfunction and inhibition of apoptosis in gastric mucosal cells.** Chinmay Pal, **Samik Bindu**, Sumanta Dey, Athar Alam, Manish Goyal, Mohd. Shameel Iqbal, Souvik Sarkar, Rahul Kumar, Kamal Krishna Halder, Mita Chatterjee Debnath, Susanta Adhikari & Uday Bandyopadhyay (**2012**) **Journal of Biological Chemistry**, 287(5): 3495-509. **[Impact Factor: 4.010] Online ISSN 1083-351X**

   [Highlighted in Zee News, Yahoo News, India Gazette, CSIR World press, Mizo News, Health India, Sify News, WSN, Pluz Media, AALA Times on August 29, 2012]

5. **Lansoprazole protects and heals gastric mucosa from non-steroidal anti-inflammatory drug (NSAID)-induced gastropathy by inhibiting mitochondrial as well as Fas-mediated death pathways with concurrent induction of mucosal cell renewal.** Pallab Maity, **Samik Bindu**, Vinay Choubey, Athar Alam, Kalyan Mitra, Manish Goyal, Sumanta Dey, Mithu Guha, Chinmay Pal, and Uday Bandyopadhyay (**2008**). **Journal of Biological Chemistry**, 283(21): 14391–14401. **[Impact Factor: 4.010], Print ISSN 0021-9258; Online ISSN 1083-351X**

6. **Melatonin reduces indomethacin-induced gastric mucosal cell apoptosis by preventing mitochondrial oxidative stress and the activation of mitochondrial pathway of apoptosis.** Pallab Maity, **Samik Bindu**, Sumanta Dey, Manish Goyal, Athar Alam, Chinmay Pal, Russel Reiter and Uday Bandyopadhyay (**2009**) **Journal of Pineal Research**, 46:314–323. **[Impact Factor: 11.613], Online ISSN 1600-079X**

7. **Indomethacin, a non-steroidal anti-inflammatory drug, develops gastropathy by inducing reactive oxygen species-mediated mitochondrial pathology and associated apoptosis in gastric mucosa: a novel role of mitochondrial aconitase oxidation.** Pallab Maity, **Samik Bindu**, Sumanta Dey, Manish Goyal , Athar Alam , Chinmay Pal, Kalyan Mitra, and Uday Bandyopadhyay (**2009**) **Journal of Biological Chemistry**, 284: 5, 3058–3068. **[Impact Factor: 4.010], Online ISSN 1083-351X**

8. **Impact of intravascular hemolysis in malaria on liver dysfunction: involvement of hepatic free heme overload, NF-κB activation and neutrophil infiltration.** Sumanta Dey, **Samik Bindu**, Manish Goyal, Chinmay Pal, Athar Alam, Mohd. Shameel Iqbal, Rahul Kumar, Souvik Sarkar and Uday Bandyopadhyay (**2012**) **Journal of Biological Chemistry**, 287 (32): 26630-26646. **[Impact Factor: 4.010], Online ISSN 1083-351X**

9. **Malarial infection develops mitochondrial pathology and mitochondrial oxidative stress to promote hepatocyte apoptosis.** Sumanta Dey, Mithu Guha, Athar Alam, Manish Goyal, **Samik Bindu**, Chinmay Pal, Pallab Maity, Kalyan Mitra and Uday Bandyopadhyay (**2009**) **Free Radical Biology & Medicine**, 46 (2): 271–281. **[Impact Factor: 6.020], ISSN: 0891-5849**

10. **Identification and molecular characterization of an Alba-family protein from human malaria parasite Plasmodium falciparum.** Manish Goyal, Athar Alam, Mohd Shameel Iqbal, Sumanta Dey, **Samik Bindu,** Chinmay Pal, Anindyajit Banerjee, Saikat Chakrabarti and Uday Bandyopadhyay (**2012**) **Nucleic Acids Research**, 40 (3):1174-90. **[Impact Factor: 11.561], Online ISSN 1362-4962**

11. **Cysteine-3 and cysteine-4 are essential for the thioredoxin-like oxidoreductase and antioxidant activities of Plasmodium falciparum macrophage migration inhibitory factor.** Athar Alam, Manish Goyal, Mohd. Shameel Iqbal, **Samik Bindu**, Sumanta Dey, Chinmay Pal, Pallab Maity, Nahren Manuel Mascarenhas, Nanda Ghoshal, Uday Bandyopadhyay. (**2011**) **Free Radical Biology & Medicine**, 50: 1659–1668. **[Impact Factor: 6.020], ISSN: 0891-5849**

12. **Synthesis and bio-evaluation of human macrophage migration inhibitory factor inhibitor to develop anti-inflammatory agent.** Athar Alam, Chinmay Pal, Manish Goyal, Milan Kumar Kundu, Rahul Kumar, Mohd. Shameel Iqbal, Sumanta Dey, **Samik Bindu**, Souvik Sarkar, Uttam Pal, Nakul C. Maiti, Susanta Sekhar Adhikari and Uday Bandyopadhyay (**2011**) **Bioorganic & Medicinal Chemistry**, 19(24):7365-73. **[Impact Factor: 2.881], ISSN: 0968-0896**

13. **Novel antimalarial drug targets: hope for new antimalarial drugs.** Athar Alam, Manish Goyal, Mohd. Shameel Iqbal, Chinmay Pal, Sumanta Dey, **Samik Bindu,** Pallab Maity and Uday Bandyopadhyay (**2009**) **Expert Review of Clinical Pharmacology**, **2(5): 469–489. [Impact Factor: 2.758], ISSN: 17512433, 17512441**

14. **Novel anti-inflammatory activity of epoxyazadiradione against macrophage migration inhibitory factor: inhibition of tautomerase and proinflammatory activities of macrophage migration inhibitory factor.** Athar Alam, Saikat Haldar, Hirekodathakallu V. Thulasiram, Rahul Kumar, Manish Goyal, Mohd Shameel Iqbal, Chinmay Pal, Sumanta Dey, **Samik Bindu**, Souvik Sarkar, Uttam Pal, Nakul C. Maiti and Uday Bandyopadhyay (**2012**) **Journal of Biological Chemistry**, 287:(29): 24844–61. **[Impact Factor: 4.010], Online ISSN 1083-351X**

15. **Aryl aryl methyl thio arenes prevent multidrug-resistant malaria in mouse by promoting oxidative stress in parasites** Manish Goyal, Priyanka Singh, Athar Alam, Sajal Kumar Das, Mohd Shameel Iqbal, Sumanta Dey, **Samik Bindu**, Chinmay Pal, Sanjit Kumar Das, Gautam Panda and Uday Bandyopadhyay (**2012**) **Free Radical Biology & Medicine**, 53(1):129-142. **[Impact Factor: 6.020], ISSN: 0891-5849**

16. **Association of heme oxygenase 1 with the restoration of liver function after damage in murine malaria by Plasmodium yoelii**. Sumanta Dey, Somnath Mazumder, Asim Azhar Siddiqui, M. Shameel Iqbal, Chinmoy Banerjee, Souvik Sarkar, Rudranil De, Manish Goyal, **Samik Bindu** and Uday Bandyopadhyay (**2014**) **Infection and Immunity,** 82(8):3113. DOI: 10.1128/IAI.01598-14. **[Impact Factor: 3.256], Online ISSN: 1098-5522**

➢ Paper Under Revision

Indomethacin impairs mitochondrial dynamics by activating PKCζ-p38-DRP1 pathway to induce apoptosis in gastric cancer and normal mucosal cells. Somnath Mazumder, Rudranil De, Subhashis Debsharma, **Samik Bindu**, Pallab Maity, Souvik Sarkar, Shubhra Saha, Asim Siddiqui, Chinmoy Banerjee, Shiladitya Nag, Debanjan Saha, Saikat Pramanik, Kalyan Mitra, and Uday Bandyopadhyay (*Manuscript under revision in* **Journal of Biological Chemistry, 2018**)

➢ Book chapter

Uday Bandyopadhyay & **Samik Bindu**, Beneficial effect of neem on human health, Chapter VII, 187-218, In **Phytochemicals and human health :Pharmacological and molecular aspects: A Tribute to Late Professor Bimal Kumar Bachhawat (Food Science and Technology).** Edited by Akhlaq A. Farooqui and Tahira Farooqui, Nova science publishers, Inc., **2011**. N.Y, U.S.A.

➢ Patents

1. Uday Bandyopadhyay, Chinmay Pal, **Samik Bindu**, Susanta Adhikari, Patent "Tryptamine derivatives, their preparation and their use in gastropathy". P**atent US 8901317 B2, Date: Dec-2, 2014.**

2. Tryptamine derivatives, their preparation and their use in gastropathy, Uday Bandyopadhyay, Chinmay Pal, **Samik Bindu**, Susanta Adhikari, **EUROPEAN PATENT SPECIFICATION, EP 2616439 B1,** Date of publication and mention of the grant of the patent**: 16.12.2015 Bulletin 2015/51**

3. **Japanese Patent,** Uday Bandyopadhyay, Chinmay Pal, **Samik Bindu**, Susanta Adhikari, **PATENT SPECIFICATION, JP 5868980, Date: 15/01/2016**

➢ Poster/ Short Articles presented in International Conference

1. **SIRT3 prevents bleomycin induced lung fibrosis in mice by blocking mitochondrial DNA damage and ROS synthesis. Samik Bindu,** Vinodkumar Pillai, Sadhana Samant, Nickolai Dulin and Mahesh P Gupta**. Experimental Biology, EB2016,** April 2-6, at the San Diego Convention Center, 111 W Harbor Dr, San Diego, CA 92101, The FASEB Journal, vol. 30 no.1 supplement 858.2, **[Impact Factor: 5.595], ISSN: 1530-6860**

2. **Sirtuins as negative regulators of cardiac fibrosis**. Sadhana Samant, **Samik Bindu**, Prabhakar Ghorpade, Vinodkumar Pillai and Mahesh Gupta (**2015**) The FASEB Journal, vol. 29 no.1 supplement 674.5, **[Impact Factor: 5.595], ISSN: 1530-6860**

➢ Abstract/ Oral presentation in International Conference

- **Bleomycin-induced pulmonary myofibroblast transformation is positively associated with de-stabilization of mitochondrial dynamics due to enhanced fusion and autophagic deregulation. Samik Bindu**, Somnath Mazumder and Uday Bandyopadhyay; **INTZOOCON 2018**, 1-3rd February 2018, University of Calcutta, India.

- **Neem Bark Extract Offers Antiulcer/ Gastroprotective Effect through the Inhibition of Apoptosis and Stimulation of Gastric Epithelial Cell Renewal**. Uday Bandyopadhyay and **Samik Bindu**; World Neem Conference, **2012,** Nagpur, India

➢ Full work presented in International Conference

Neem bark extract prevents non steroidal anti-inflammatory drug-induced gastric ulcer by inhibiting gastric mucosal apoptosis and favouring cell renewal. Uday Bandyopadhyay, **Samik Bindu**, Kalyan Mitra and Pallab Maity; World Neem Conference, **2012**

PROFESSIONAL EXPERIENCE

Administrative Assignments in Cooch Behar Panchanan Barma University (CBPBU)

1. Co-organizer of Flow Cytometry Workshop in CBPBU, supported by Department of Biotechnology, Government of West Bengal and Sponsored by BD Biosciences.
2. Co-organizer of Workshop on Immunological Techniques in CBPBU, supported by Department of Biotechnology, Government of West Bengal.
3. Member of Anti-Sexual Harassment Cell, CBPBU.

4. Member of Board of Studies in Zoology, Undergraduate (UG) and Postgraduate (PG), CBPBU.
5. Member of Board of Studies in Environmental studies, UG, CBPBU.
6. Moderator, Paper Setter, Examiner and Evaluator of Zoology, PG Studies, CBPBU.
7. Member of Faculty Council, Science, CBPBU.

EDITOR/ ASSOCIATE EDITOR OF SCIENTIFIC JOURNAL

Associate Editor in ***International Journal of Zoology and Animal Biology***, Medwin Publishers, (international peer-reviewed publisher)