UNIVERSITY OF CALCUTTA

FACULTY ACADEMIC PROFILE/ CV

Full name of the faculty member: SAJAL RAY

Designation: PROFESSOR OF ZOOLOGY

Specialisation : INVERTEBRATE IMMUNOLOGY AND TOXICOLOGY

Contact information : Department of Zoology
University of Calcutta
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Academic qualifications:

College/ university from which the degree was obtained	Abbreviation of the degree
Master of Science, Calcutta University	M.Sc.
Master of Philosophy, Calcutta University	M.Phil.
Doctor of Philosophy, Jadavpur University	Ph.D.

Positions held/ holding:

- Lecturer of Zoology, Ramakrishna Mission Vivekananda Centenary College, Rahara, West Bengal.
- Lecturer and Senior Lecturer of Zoology, Vidyasagar University, Medinipur, West Bengal.
- Fogarty post doctoral visiting research fellow at the National Institute of Health, National Heart, Lung and Blood Institute, Maryland, U.S.A.
- Professor of Zoology, University of Calcutta, West Bengal (current position).

Research interests: 200 – 250 words max

Our research involves understanding of the different levels and mechanisms of innate immunological reactivities of aquatic invertebrates. We investigate the cell mediated and humoral responses of sponges, annelids, crabs and molluscs exposed to agrotoxins, geogenic toxins, industrial xenobiotics and nanoparticles. Our research is aimed to develop cellular and molecular markers of aquatic toxicity in specific indicator species. Mechanism and radiation of immunotoxicological reactivities from urmetazoans and living fossils to their evolutionary descendents are being researched with reference to biological response modifications.

Parallely, xenobiotic induced cellular and biochemical stress analyses are being investigated in the multiple types of aquatic invertebrates with ecological, biotechnological and medicinal importance. Immunological resilience of invertebrates in the faces of environmental adversities and chemical stress are analysed both in the field and laboratory conditions. Estimation and analyses of physiological stress are being carried out in different test species exposed to diverse groups of chemical toxins i.e. arsenic, pyrethroids, azadirachtin, washing soda, diesel, copper nanoparticle etc. Effects of toxin exposure on different blood parameters, cytotoxicity, apoptotic response, oxidative status, cyto and histoarchitecture, activities of lysozyme and other target enzymes are examined in selected aquatic invertebrates. Contaminant induced genotoxicity and lysosomal membrane fragility of invertebrate blood cells and other target cells are being quantitated for analysis of the magnitude of chemical stress experienced by the organisms inhabiting a biologically unsafe environment. Immunotoxicity of organic contaminants of vehicular origin is screened in the benthic organisms of the ecologically sensitive region of Sunderbans biosphere reserve.

Research guidance:

Number of researchers awarded M.Phil/ Ph.D degrees: M.Phil. -1, Ph.D. -7.

Number of researchers pursuing M.Phil/ Ph.D: Ph.D -3.

Projects :

Completed projects:

- Early detection of neurovascular damage due to *Plasmodium falciparum* and *Plasmodium vivax* and research for preventive and curative formulations of herbal origin. Defence Research Laboratory, DRDO, Tezpur, Ministry of Defence, Govt. of India
- Experimental studies on interaction of carbamates, stress and organophosphates (Collaborative with Dept. of Physiology, WB State University). Defence Research Development Establishment (DRDE), Gwalior, Ministry of Defence, Govt. of India
- Toxicological response of fresh water edible molluscs exposed to detergent and arsenic.(As participatory scientist of Zoology Department). University Grant Commission (SAP-DRS I).
- Screening and analyses of immunotoxicity of fenvelerate and cypermethrin in the economically important freshwater molluscs of West Bengal.(As mentor scientist). Department of Science and Technology (DST-WOS-A), Govt. of India

Current projects:

Membership of Learned Societies:

Life member, Zoological Society, Kolkata.
Fellow, Institute of Chemists, Calcutta.
Fellow, Zoological Society, India.

Awards : Fogarty visiting fellow at NHLBI, NIH, USA.

Tie - ups and collaborations:

Research group:

Dr. Mitali Ray
Dr. Niladri Sekhar Bhunia
Dr. Anindya Sundar Bhunia
Dr. Pallab Banerjee
Mr. Krishnendu Das
Mr. Soumalya Mukherjee

Mr. Arunodaya Gautam

Select list of publications: maximum limit of 10 publications (best and latest)

1. Ray, M., Bhunia, N.S., Bhunia, A.S., **Ray, S.** 2016. Expression analyses of interferon gamma, tumor necrosis factor alpha and inducible nitric oxide synthase in the hemocyte morphotypes of two commercially important Indian molluscs. *Aquac. Rep*. **4**, 30-35. Elsevier.

2. Mukherjee, S., Ray, M., **Ray, S**., 2016c. Shift in aggregation, ROS generation, antioxidative defense, lysozyme and acetylcholinesterase activities in the cells of an Indian freshwater sponge exposed to washing soda (sodium carbonate). *Comp. Biochem. Physiol. C* **187**, 19-31. Elsevier.

3. Mukherjee, S., Bhunia, A.S., Bhunia, N.S., Ray, M., **Ray, S**., 2016a. Immunomodulatory effects of temperature and pH of water in an Indian freshwater sponge. *J. Therm. Biol*. **59**, 1–12. Elsevier.

4. Bhunia, A.S., Mukherjee, S., Bhunia, N.S., Ray, M., **Ray, S**., 2016. Immunological resilience of a freshwater Indian mollusc during aestivation and starvation. *Aquac. Rep*. **3**, 1–11. Elsevier.

5. Mukherjee, S., Ray, M., **Ray, S**., 2016b. A report of hailstorm damage to two species of freshwater sponge (Demospongiae: Haplosclerida: Spongillidae) populations of West Bengal, India. *J. Threat. Taxa* **8(4)**, 8719–8727.

6. Mukherjee, S., Ray, M., **Ray, S**., 2015b. Immunotoxicity of washing soda in a freshwater sponge of India. *Ecotoxicol. Environ. Safe*. **113**, 112–123. Elsevier.

7. Mukherjee, S., Ray, M., Dutta, M.K., Acharya, A., Mukhopadhyay, S.K., **Ray, S**., 2015c. Morphological alteration, lysosomal membrane fragility and apoptosis of the cells of Indian freshwater sponge exposed to washing soda (sodium carbonate). *Ecotoxicol. Environ. Safe*. **122**, 331–342. Elsevier.

8. Mukherjee, S., Ray, M., **Ray, S**., 2015a. Phagocytic efficiency and cytotoxic responses of Indian freshwater sponge (*Eunapius carteri*) cells isolated by density gradient centrifugation and flow cytometry: a morphofunctional analysis. *Zoology* **118**, 8–18. Elsevier.

9. Ray, M., Bhunia, N.S., Bhunia, A.S., **Ray, S**., 2013a. A comparative analysis of morphological variations, phagocytosis and generation of cytotoxic agents in flowcytometrically isolated hemocytes of Indian molluscs. *Fish Shellfish Immunol*. **34**, 244–253. Elsevier.

10. Ray, M., Bhunia, A.S., Bhunia, N.S., **Ray, S**., 2013b. Density shift, morphological damage, lysosomal fragility and apoptosis of hemocytes of Indian molluscs exposed to pyrethroid pesticides. *Fish Shellfish Immunol*. **35**, 499–512. Elsevier.