

STATEMENT OF PURPOSE

By Ratnabali Ghosh

My father is a doctor who has been working in rural areas of Gabberia for decades now. From a young age, he would often take me with him to work, and I would play on the hospital grounds while he treated his patients. On the way back, he would tell me about the cases he had, especially the more common ones, like those suffering from Cholera, TB, etc. He wished me to understand my privilege of being born in the city, where I did not face problems his patients did, even if it is as simple as access to clean drinking water. While I was grateful, I learned its true horror when I fell dangerously ill, having drunk contaminated tube well water, from one of his ex-patient's home. Though the recovery was painful, I was curious as to why I was the only one affected, why tube well water tastes different, and if the people there were suffering too, but at a much slower pace than me, symptomatically.

I carried this feeling throughout my school life, where subjects of biology and environmental science gave me some of the answers I sought. I was extremely active and vocal in environmental campaigns, especially against water wastage, which my school encouraged.

I decided to study microbiology, at Surendranath College of University of Calcutta, from where I emerged with a first-class B.Sc. honours degree. I knew from school that microbes have the most important role in maintaining the ecological balance, and I knew that it is within this domain, that can provide natural solutions to the pollutions we have been experiencing, be them natural or artificial. The three years at college helped me expand my initial microbial applications to other domains, adding a chemical and physical view of the little world. This helped me narrow down my choices for a M.Sc. subject, ultimately enrolling at IIT Kharagpur to study 'Chemical and Molecular Biology', an interdisciplinary subject taught in collaboration with IACS, Kolkata.

I did my final year dissertation in the laboratory of Dr. Benu Brata Das of IACS, Kolkata. My project mainly focused on studying the effects of reactive oxygen species (ROS) on the mitochondrial DNA (mtDNA). Mt DNA is an essential component of the eukaryotic cells and accumulation of mtDNA damage has been involved in neurodegenerative disorders such as Parkinson's, Alzheimer, etc. The relative proximity to ROS generating sites (ETC in respiration), along with the lack of the ability to code for its own repair enzymes, makes the mtDNA particularly more susceptible to damage. My project was cut short due to the pandemic, but not before I could get an idea and hands-on experiences to master various tools of molecular biology. During my early days at the lab, and my spare time, I would eagerly assist the other members of the lab, who were all very kind enough and trusted me to perform experiments on my own, even though they were not part of my project, dealing with topics such as mitophagy, Tfam protein, etc. This was fundamental in bringing a sense of confidence in me and also helped expand my experience with molecular biology tools, such as gel assays, RT-PCR, blotting, RNA synthesis, flow cytometry, confocal microscopy, etc.

I did a summer internship in 2019 under Professor Soumya De of IIT Kharagpur, on protein synthesis, purification and assay. I wanted to learn techniques in a laboratory that is different from my dissertation lab, as well as get some experience before joining IACS to do my project work.

I heard about Dr. Pinaki Sar and his work, while attending classes at IIT Kharagpur. Reading up on his research areas, reminded me of my old mission. When I came across this programme, I was delighted to see an opportunity to work under him, that too in the topic of understanding a natural way of tackling purification of water, contaminated by heavy metals like arsenic, using microbes. With presence of portable water decreasing globally, it is very essential to preserve our natural sources of water, and prevent their contamination, both naturally and artificially, especially when India has a healthy rural population. Using naturally occurring bacteria to deal with such a problem will not only be environmental-friendly, but also prevent the side-effects of using artificial chemicals.

With my background in microbiology, and my laboratory experiences during MSc, I wish to apply for a PhD under this project, where I hope to contribute enough in understanding how nature tries to heal her own problem, in this case using bacteria, and perhaps pave way to imitate this solution in all cases of arsenic poisoning of water in India, if not the world.