

Curriculum Vitae

RANJIT DAS, Ph. D

Postdoctoral researcher

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Research specialization:

Microbiology, Molecular biology, Applied microbiology & biotechnology, and Enzyme Technology

Professional summary:

Reliable research scientist awarded Ph. D in Biotechnology and Graduate and Master in Microbiology. Research expertise in the fields of microbiology, molecular biology and enzyme technology. Focussed on cleaner and safer environments by exploring diverse catabolically potential microbes and advocating their activities for biotechnological applications. Specialized to handle different environmental samples such as hydrocarbon-polluted oily sludge, electronic-waste, antibiotics contaminated waste water and soil and hyper-saline-lake sediment. Keen interest in learning new things, develop and apply novel methods.

Postdoctoral research experience:

1. **Postdoctoral Research Associate (March 2018-March 2022)** College of Environmental Sciences and Engineering, Nankai University, Tianjin, P.R. China.
 2. **Postdoctoral Research Associate (April 2015-October 2017)** Guangzhou Institute of Geochemistry, Chinese Academy of Sciences (GIGCAS), Guangzhou, P.R. China.
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Academic qualification:

2010-February 2015	Ph. D in Biotechnology from National Institute of Technology Durgapur, India. Thesis entitled “ <i>Exploration and exploitation of microbial diversity and catabolic potential for the bioremediation of petroleum hydrocarbons</i> ”
2008	M. Sc. in Microbiology, Vidyasagar University, West Bengal, India
2006	B. Sc. in Microbiology, Vidyasagar University, West Bengal, India

Honors and Awards:

1. Awarded **Chinese Postdoctoral Fellowship, March 2018-March 2022** by Nankai University, Tianjin, P.R. China.
2. Awarded **CAS Fellowship** by **Chinese Academy of Sciences** for Postdoctoral research **April 2015-October 2017** at Guangzhou Institute of Geochemistry, Chinese Academy of Sciences (GIGCAS), Guangzhou, P.R. China.
3. Awarded **Senior Research Fellow (SRF), 2012-2013** by Department of Science and Technology (DST), Govt. of India.
4. Awarded **Junior Research Fellow (JRF), 2010-2012** by Department of Science and Technology (DST), Govt. of India.

5. Awarded **Project Assistant (PA)**, **2009-2010** by Department of Biotechnology, Indian Institute of Technology Kharagpur (IIT-KGP).
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Publications:

❖ *Paper published in peer reviewed or international journal*

1. **Ranjit Das**, Zhishu Liang, Guiying Li, Taicheng An (2020) A non-blue laccase of *Bacillus* sp. GZB displays manganese-oxidase activity: a study of laccase characterization, Mn(II) oxidation and prediction of Mn(II) oxidation mechanisms. **Chemosphere**, 252, 126619. (IF: 7.086)
2. **Ranjit Das**, Zhishu Liang, Guiying Li, Bixian Mai, Taicheng An (2019) Genome sequence of a spore-laccase forming, BPA degrading *Bacillus* sp. GZB isolated from an electronic-waste recycling site reveals insights into BPA degradation pathways. **Archives of Microbiology** 201:623–638. (IF: 2.552)
3. **Ranjit Das**, Guiying Li, Bixian Mai, Taicheng An (2018) Spore cells from BPA degrading bacteria *Bacillus* sp. GZB displaying high laccase activity and stability for BPA degradation. **Science of the Total Environment** 640–641:798–806. (IF: 7.963)
4. **Ranjit Das** and Sufia K Kazy (2014) Microbial diversity, community composition and metabolic potential in hydrocarbon contaminated oily sludge: prospects for *in situ* bioremediation. **Environmental Science and Pollution Research** 21(12):7369–7389. (IF: 4.223)
5. **Ranjit Das**, Choudhary P, Singh Oberoi A, Dey P, Kazy SK (2014) Community composition and polycyclic aromatic hydrocarbon (PAH) biodegradation potential of microorganism isolated from oily sludge. **Journal of Environmental Research and Development** 9(1):38–49. (Peer reviewed Journal)
6. Linyun Li, Qing Wang, Wenjing Bi, Jie Hou, Yingang Xue, Daqing Mao, **Ranjit Das**, Yi Luo, Xiangdong Li (2020) Municipal solid waste treatment system increases ambient airborne bacteria and antibiotic resistant genes. **Environmental Science & Technology** 54:3900–3908. (IF: 9.028)
7. Lei Liu, Qing Wang, Huai Lin, **Ranjit Das**, Siyi Wang, Hongmei Qi, Jing Yang, Yingang Xue, Daqing Mao, Yi Luo (2020) Amoxicillin Increased Functional Pathway Genes and Beta-Lactam Resistance Genes by Pathogens Bloomed in Intestinal Microbiota Using a Simulator of the Human Intestinal Microbial Ecosystem. **Frontiers in Microbiology** 11:1213. (IF: 5.640)
8. Huai Lin, Wang Qing, Lei Liu, Zeyou Chen, **Ranjit Das**, Yanhui zhao, Daqing Mao, Yi Luo (2020) Colonization of mice with amoxicillin-associated *Klebsiella variicola* drives inflammation via Th1 induction and Treg inhibition. **Frontiers in Microbiology**. 11:1256. (IF: 5.640)
9. Lei Liu, Qing Wang, Xinyan Wu, Hongmei Qi, **Ranjit Das**, Huai Lin, Jingliang Shi, Siyi Wang, Jing Yang, Yingang Xue, Daqing Mao, Yi Luo (2020) Vancomycin exposure caused opportunistic pathogens bloom in intestinal microbiome by simulator of the human intestinal microbial ecosystem (SHIME). **Environmental Pollution** 265:114399. (IF: 8.071)
10. Huai Lin, Qing Wang, Meng Yuan, Lei Liu, Zeyou Chen, Yanhui zhao, **Ranjit Das**, Yujing Duan, Ximing Xu, Yin Gang Xue, Yi Luo, Daqing Mao (2020) The prolonged disruption of a single-course amoxicillin on mice gut microbiota and resistome, and recovery by inulin, *Bifidobacterium longum* and fecal microbiota transplantation. **Environmental Pollution** 265:114651. (IF: 8.071)
11. Lu Tan, Fu Wang, Minmin Liang, Xiaolong Wang, **Ranjit Das**, Daqing Mao, Yi Luo (2019) Antibiotic resistance genes attenuated with salt accumulation in saline soil. **Journal of Hazardous Materials** 374:35–42. (IF: 10.588)
12. Qing Wang, Yujing Duan, Shaopeng Wang, Litao Wang, Ze-Lin Hou, Yu-Xiao Cui, Jie Hou, **Ranjit Das**, Daqing Mao, Yi Luo (2019) Occurrence and distribution of clinical and veterinary antibiotics in the faeces of a Chinese population. **Journal of Hazardous Materials** 383:121129. (IF: 10.588)
13. Yujing Duan, Zeyou Chen, Lu Tan, Xiaolong Wang, Yingang Xue, Shaopeng Wang, Qing Wang, **Ranjit Das**, Huai Lin, Jie Hou, Linyun Li, Daqing Mao, Yi Luo (2019) Gut resistomes, microbiota and

antibiotic residues in Chinese patients undergoing antibiotic administration and healthy individuals. **Science of the Total Environment** 705:135674. (IF: 7.963)

14. Zhishu Liang, Guiying Li, Taicheng An, **Ranjit Das** (2016) Draft Genome Sequence of *Bacillus* sp. GZT, a 2,4,6-Tribromophenol Degrading Strain Isolated from the River Sludge of an Electronic Waste-Dismantling Region. **Genome Announcements** 3(4): e00474–16. (American Society for Microbiology; ASM Journal)
 15. Zhishu Liang, Guiying Li, Taicheng An, Guoxia Zhang, **Ranjit Das** (2016) Draft Genome Sequence of a Tetrabromobisphenol A- Degrading Strain, *Ochrobactrum* sp. T Isolated from an Electronic Waste Recycling Site. **Genome Announcements (ASM)** 4(4): e00680–16. (American Society for Microbiology; ASM Journal)
 16. Gargi Biswas, **Ranjit Das**, Sufia K Kazy (2015) Chromium bioremediation by *Alcaligenes faecalis* strain P-2 newly isolated from Tannery effluent. **Journal of Environmental Research and Development** 9(3A):840–848. (Peer reviewed Journal)
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❖ **Book chapter:**

Priyadarshini Dey, **Ranjit Das** and Sufia K Kazy (2018) Benzene Biodegradation During Growth substrate by *Aerococcus* sp. Isolated from Oil Sludge. In: Sharma A., Singh V., Bhattacharjya R., Kartha S. (eds) Urban Ecology, Water Quality and Climate Change. Water Science and Technology Library, vol 84, pp 305-319, Springer, Cham.

❖ **Papers published in proceedings:**

1. **Das R**, Sar P, Kazy SK (17-19 February, 2011) Assessment of genetic diversity and catabolic potentials of indigenous microorganisms in petroleum hydrocarbon contaminated sludge for their potential application in bioremediation, international conference on sustainable water resources management and climate change adaptation (SWRMCCA), organized by National Institute of Technology, Durgapur, West Bengal, India.
 2. Singh Oberoi A, **Das R**, Sar P, Kazy SK (17-19 February, 2011) Naphthalene Biodegradation by an *Aerococcus* sp. isolated from Petroleum Hydrocarbon Contaminated Sludge, International conference on sustainable water resources management and climate change adaptation (SWRMCCA), organized by National Institute of Technology, Durgapur, West Bengal, India.
 3. **Das R**, Sar, P., Kazy SK (5-6 October, 2010) Enrichment, isolation, and characterization of hydrocarbon degrading bacteria from petroleum hydrocarbon containing sludge, National Conference on Biotechnology and Environment, organized by Department of Biotechnology, National Institute of Technology Durgapur, West Bengal, India.
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Conference participations:

1. **Das R**, Li G, Mai B, An T (30th June-4th July, 2017) Identification and characterization of laccase, a spore associated multicopper oxidase and its application for the biodegradation of Bisphenol A, “The 33rd International Conference of the Society for Environmental Geochemistry and Health (SEGH 2017)” Guangzhou, China.
2. Biswas G, **Das R**, Kazy SK (26-28th December, 2014) Chromium bioremediation by *Alcaligenes faecalis* strain P2 newly isolated from Tannery effluent, “7th International Congress of Environmental Research” at R.V College of Engineering, Bangalore, Karnataka, India.
3. **Das R**, Choudhary P, Singh Oberoi A, Dey P, Kazy SK (19-21th December, 2013) Community composition and polycyclic aromatic hydrocarbon (PAH) biodegradation potential of microorganism isolated from oily sludge, on “6th International Conference of Environmental Research” Aurangabad, India.
4. **Das R**, Kazy SK (13-14 December, 2012) International Conference on Interface between Chemistry & Environment (ICICE-2012), organized at Ramjas College, University of Delhi, Delhi, India.

5. **Das R**, Kazy SK (22-25 November, 2012) Aerobic and anaerobic reduction of chromium (VI) in presence of anthracene by *Bacillus pumilus* strain BPD-14 isolated from oil sludge, 53rd Annual Conference of Association of Microbiologists of India's (AMI), International Conference on Microbial World: Recent Innovations and Future Trends, organized at KIIT University, Bhubaneswar, India.
6. **Das R**, Sar P, Kazy SK (15-17 December, 2011) Diversity and catabolic potentials of indigenous microorganisms for bioremediation of oil sludge, 4th International Congress of Environmental Research, organized by SVNIT, Surat, India.
7. Kazy SK, **Das R**, Sar P (26-30 June, 2011) Genetic diversity of indigenous microorganisms in petroleum hydrocarbon containing sludge, 4TH Congress of European Microbiologists: FEMS 2011, Geneva, Switzerland.
8. **Das R**, Sar P, Kazy SK (14-17 December, 2010) Exploring molecular diversity and bioremediation potentials of indigenous microorganisms in petroleum hydrocarbon contaminated sludge, 51st Annual Conference of Association of Microbiologists of India's International Symposium on Recent Advances in Cross-disciplinary Microbiology: Avenues & Challenges, organized at Birla Institute of Technology, Mesra, Ranchi, Jharkhand, India.
9. Singh Oberoi A, **Das R**, Sar P, Kazy SK (14-17 December, 2010) 51st Annual Conference of Association of Microbiologists of India's International Symposium on Recent Advances in Cross-disciplinary Microbiology: Avenues & Challenges, organized at Birla Institute of Technology, Mesra, Ranchi, Jharkhand, India.
10. Assisted in the event management of the workshop on Bioinformatics in Genomics and Proteomics (P) at Department of Biotechnology, IIT Kharagpur October 09-10, 2009. WB, India.

Member of Professional Bodies:

1. Life membership: Association of Microbiologists of India (AMI)
2. Life membership: National Environmental Science Academy (NESA)
3. Life membership: Asian Federation of Biotechnology (AFOB)
4. Regular membership: American Society of Microbiology (ASM)
5. Annual membership: International Biodeterioration and Biodegradation Society (IBBS)
6. Personal membership: European Federation of Biotechnology (EFB)

Techniques Known:

Microbiological techniques:

- Bacteria and archaea isolation.
- Pure culture development.
- Identification by 16S rRNA gene and biochemical analysis.
- Anaerobic cultivation of organisms.
- Preparation and study of genomic libraries.
- Microbial degradation of hydrocarbon and bisphenol compounds.
- Microbe-metal interaction, Microbial remediation of different heavy metals.

- Development of engineered *E. coli* and metal-oxidation assay.
- Microscopic technique (Bright field, Phase-contrast, TEM, SEM).

Molecular biological techniques:

- Nucleic acid (DNA, RNA and plasmid) isolation.
- Metagenomic DNA extraction.
- Polymerase chain reaction (PCR), high-throughput, hot-start, touchdown PCR.
- Nucleic acid purification (DNA, RNA and plasmid).

- Gene isolation, cloning and transformation.
- Gene expression and protein purification.
- Amplified Ribosomal DNA Restriction Analysis (ARDRA).
- Denaturing Gradient Gel Electrophoresis (DGGE).
- Agarose and polyacrylamide gel electrophoresis.
- Activity staining and agarose gel plate assay.

Bioinformatics Skills:

- DNA sequence analysis by BioEdit, Chromas, Ribosomal Database Project (RDP) tools kit.
- Phylogenetic analysis by ClustalW and MEGA, NCBI database Project.
- Primer designing by Primer 3.
- Protein sequence analysis using Expert Protein Analysis System (SIB ExPASy).
- Protein structure determined by Swiss-model programming and PyMol.
- Sequin for the sequence submission.

- Whole genome sequence analysis and submission.
- RAST for whole genome analysis, MG-RAST NCBI tool kit.
- Development of genome map using CG server view.
- Scripting language: R

Analytical techniques:

- HPLC, GC, HPLC-MS, GC-MS.
- X-ray diffraction (XRD) analysis.
- Atomic absorption spectroscopy (AAS).
- Fourier Transform Infrared Spectroscopy (FTIR).
- X-ray photoelectron spectroscopy (XPS).
- Thin layer chromatography (TLC).

Computing skills:

- Windows, MS Office, Adobe Photoshop, Origin Pro., Graph pad prism.
- Multivariate statistical analysis like CCA, PCA, UPGMA, RDA by MVSP 3.1.
- R-programming.

Research work:

Post-Doctoral Research Summary

My postdoctoral study at Guangzhou Institute of Geochemistry, China, focused on laccase enzyme and their implementation for pollutant removal. It is well-known oxidoreductase enzyme that catalytically functioned on a wide range of organic and inorganic substrates. Currently, this enzyme is broadly applied in different sectors such as biotechnological, food industry and environments. This study was isolated laccase enzyme from spore cells of *Bacillus* sp. GZB. It further cloned and expressed in *E. coli* BL21. Both native and expressed enzymes were purified and characterized in the present of different physical and biochemical parameters such as pH, temperature, metal ions, organic solvents and inhibitors. I revealed a highly active and stable laccase enzyme, which could degrade bisphenol A (BPA). Molecular modelling and biochemical assays were further categorized a non-blue character of laccase which showed Mn(II)-oxidase activity. We developed a new method “**Agarose gel plate assay**” to characterize Mn(II)-oxidase activity of laccase. The metabolic pathways of BPA degradation were predicted by analysing different intermediate compounds using chromatography (HPLC, LC-MS and GC-MS). The recombinant *E. coli* was also applied to formulate biogenic manganese oxides (BMnO₂), which also showed an efficient BPA degradation ability. The whole genome sequencing (WGS) of *Bacillus* sp. GZB explored genomic plasticity towards BPA degradation. Finally, a comprehensive overview on BPA-degradation pathways of *Bacillus* sp. GZB was drawn.

Currently, I have worked at College of Environmental Sciences and Engineering, Nankai University, China as a postdoctoral researcher. My research topic is “**Dissemination of antibiotic resistance genes in bacteria and archaea in diverse antibiotic-polluted environments**”. This study is primarily focused on antibiotic resistance genes scenario in haloarchaeal strains. I have isolated some novel

haloarchaeal strains from polluted saline lake and characterized by 16S rRNA gene sequencing. One haloarchaeal strain *Haloprofundus haiheriveri* MHR1 is characterized as novel strain (CP039833; manuscript under preparation). The whole genome sequencing deciphers many antibiotic resistance genes (ARGs). Among them metallo β -lactamase gene is cloned and expressed and characterized by purification.

Doctoral Research Summary:

In my doctoral study, I had done the project on “**Exploration and exploitation of microbial diversity and catabolic potential for the bioremediation of petroleum hydrocarbons**”. Culture-independent method delineated some potential hydrocarbon degrading microbial communities including β -*Proteobacteria*, *Firmicutes*, δ -*Proteobacteria*, *Bacteroidetes*, *Acidobacteria*, α -*Proteobacteria*, followed by archaea *Thermoprotei*, *Methanocellales*, *Methanosarcinales*/*Methanosaeta*, and *Methanoculleus*. Identification of Methyl coenzyme M reductase A (*mcrA*; a functional biomarker gene), signposted predominance of hydrogenotrophic methanogenic Archaea (*Methanocellales*, *Methanobacteriales* and *Methanoculleus* members) over acetoclastic methanogens (*Methanosarcinales* members). However, the cultivable microbial population dominated by *Bacillus*, *Paenibacillus*, *Micrococcus*, *Brachybacterium*, *Aerococcus*, *Zimmermannella*, *Pseudomonas* and *Pseudoxanthomonas*. The culturable microbes metabolically characterized in the presence of various heavy metals and hydrocarbons. To aid in better understanding the role of microbes in the sludge pit, microcosm studies had been conducted and bioremediation performance of community organisms was measured. Both bioaugmented and biostimulated microcosm showed 78-80% removal of total petroleum hydrocarbon (TPH) after 4-6 months of incubation. Overall observation indicated the presence of diverse groups of microorganisms including hydrocarbonoclastic, nitrate reducing, sulphate reducing, fermentative, syntrophic, methanogenic and methane-oxidizing bacteria and archaea within the sludge community. Such microbial community members have the potential for in situ bioremediation of hydrocarbon contaminated oily sludge.

References:

1. Kazy Sufia Khnnam, Ph. D
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National Institute of Technology Durgapur
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2. Pinaki Sar, Ph. D
Professor
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Indian Institute of Technology Kharagpur
Kharagpur- 721302, West Bengal, India
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3. Paltu Kr. Dhal, Ph. D
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Department of Life Science and Biotechnology
Jadavpur University, West Bengal, India
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4. Prof. Taicheng An
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