Dr. Ruchi Gulati Marwah

Permanent position: **(Since August 2009 till date)**
Associate Professor
Department of Microbiology
Bhaskaracharya College of Applied Sciences
University of Delhi
Sector 2, Phase 1, Dwarka, New Delhi-110075
(currently on Extraordinary leave from University of Delhi)

Email: ruchi.gulati@bcas.du.ac.in; ruchigulatimarwah@gmail.com

Education

2000	Doctor of Philosophy (Ph.D.) in Microbiology, University of Delhi (Title: Fermentative production of *Aspergillus terreus* and *Fusarium globulosum* lipases and their potential industrial applications)
1995	Master of Science (M.Sc.) in Microbiology, University of Delhi – **Gold Medalist** (76.4%)
1993	B.Sc. (Hons) Microbiology, University of Delhi – **First Division** (69.4%)
1990	Class XII, Senior School certificate examination (CBSE), 78.8% marks
1988	Class X, Secondary School Examination (CBSE), 79.0%

Fellowships

1995-2000	University Grants Commission, India, Junior and Senior Research fellowship for pursuing Ph.D. in Microbiology
1993-1995	All India Post Graduate Scholarship awarded for pursuing Masters in Microbiology

A. Post Doctoral Experience & Research Funding

My doctoral and postdoctoral research focused on producing primary and secondary metabolites, enzymes (asparaginase, lipases, amylases), and antimicrobial compounds from fungi. With over 20 years of experience and 28+ peer-reviewed publications, I initiated an undergraduate project in 2018 on microbial biofilms. My team studied an environmental isolate, *Bacillus paralicheniformis*, having an inherent ability to form robust biofilms. We performed taxonomic and biochemical analyses to characterize its extracellular polymeric substances (EPS), exploring their biotechnological potential and role in antibiotic resistance. This work earned best poster awards at four national and international conferences.

1. **From August 2003 till September 2004 and from January 2005 to December 2006*:***
   Post-doctoral research fellow in the project titled "Bioactivity-driven chemical investigation of Omani biodiversity for medicinally and agronomically valuable compounds: the development of Omani Natural Products" at Sultan Qaboos University, Muscat, Sultanate of Oman ***(Three years).***

2. **From 1st February 2007 till 31st July 2007***: Research Associate in the DST-ILTP project titled "Production and Applications of Microbial Lipases"* in the Department of Microbiology, University of Delhi, South Campus.

3. **Principal Investigator for DST- Fast track project titled "Biologically active antimicrobial secondary metabolites from endophytic fungi isolated from vegetable crops"** *from 1st August 2007 till 31st July 2010. (Total cost: 1.83 million**).***

4. **Principal Investigator for Delhi University Innovation project (Project no. BCAS 201) 2013-15 titled "Low cost electricity generation using Bio-photovoltaic Technology: A Green Energy Initiative"**. (*Total cost: Rs. 5, 50, 000).* 5 undergraduate students did their undergraduate dissertations in this project.

5. **Principal Investigator for Delhi University Innovation project 2015-16 (Project no.: BCAS 306) titled "Clean Electricity Generation from Waste Water Samples collected from Delhi-NCR using Microbial Fuel Cell Technology: A Green Energy Initiative "**. (*Total cost Rs. 500, 000*). 5 undergraduate students did their undergraduate dissertations in this project.

6. **Biofilm research project (Since 2018 till date).** This partially funded by Star College Scheme, Department of Biotechnology, Government of India. Till date, 19 students have done their summer internship or research training in this project.

B. Teaching Experience

1. Teaching at the Department of Microbiology, Bhaskaracharya College of Applied Sciences, University of Delhi (Current designation: Associate professor). I joined the department on temporary basis from 26 November, 2007 to 19 August 2009 (and from 20 August 2009 till 9th August 2021 as a permanent employee. Taught as a Guest lecturer in Department of Microbiology, Institute of Home Economics, University of Delhi from 29th July to 25th November, 2007 (4 months), taught the modules on Bacteriology and Biochemistry.

2. Conducted Part-time teaching (3h/week) for Department of Biology, College of Science, Sultan Qaboos University, Muscat, Sultanate of Oman, taught the Bacteriology Course (BIOL 4030) and also assisted in the Demonstration of Microbiology Laboratory Course (BIOL3441) in the Spring Semester (Jan-May, 2006).

C. ADMINISTRATIVE ASSIGNMENTS

At the University level

- Member, Committee for revision of B. Sc. (Hons) Microbiology course curriculum, [Modes: Semester, 2010; Four year undergraduate program (FYUP) 2013-14; Choice based credit system (CBCS) 2015-16; and LOCF mode 2019-20, at the Department of Microbiology, University of Delhi South Campus].

At the College level

- Deputy superintendent of the college for coordinating University practical and theory examination in April 2013 to December 2013 and from November 2020 to August 2021.
- Member of Departmental committee for Admissions, Time Table, Internal assessment moderation, Purchases etc. from time to time since 2008.

- Co-convener, NIRF (2019-20) and Member, India today Ranking (2019-20) committees.
- Co-convener, Annual Report & Prospectus Committee (2019-20) and member of the same
- Member (2008-11); Co-convener (2017-18) and Convener (2018-19) of Extra-curricular activcity (ECA) Committee
- Member, Proctorial & Anti-ragging committee 2017-18
- Coordinator for the publication of first two issues of e-Newsletter of the College Bhaskarjyoti (Vol.1 March 2018 & Vol. 2 October 2018).

At the department level

- **Teacher-in-charge of the department (2013-15, and from 1 Aporil 2021 till 8 August 2021):** coordinated admissions, time tabling, purchase of equipment and consumables, examination (internal and external), maintained departmental data base for national ranking and internal quality assurance
- **Coordinator for the departmental Star college scheme (2015-18),** funded by Department of Biotechnology, Minisitry of Science and Technology, Government of India. Responsible for organising various co-curricular activities for the department including conferences, seminars, hands-on training, workshops, and lecture series.

E. RESEARCH PUBLICATIONS

- Chawla, H., Anand, P., Garg, K., Bhagat, N., Varmani, S.G., Bansal, T., McBain, A.J. and **Marwah, R.G**., 2023. A comprehensive review of microbial contamination in the indoor environment: sources, sampling, health risks, and mitigation strategies. *Frontiers in Public Health*, *11*, p.1285393.
- Adhikary A., Bansal T., Gupta P., Jain D., Anand P., Gupta R., Virdi J. S., **Marwah R. G.** (2021). Draft Genome Sequence of a Poly-γ-Glutamic Acid-Producing Isolate, *Bacillus paralicheniformis* Strain bcasdu2018/01. Microbiology Resource Announcements. 10(46):e0101321. https://journals.asm.org/doi/10.1128/MRA.01013-21
- Mongia, G., Kaur, I., Marwah, R. G. And Malyan, A. (2021). A comprehensive review of the different methods for the construction of MFC's and their effect on the performance of MFC. International Journal of Engineering and Technology. 8(5): 4402-4413.
- Agarwal, A., Verma, G., Singh, Y., Kumari, A., Kumar, S., Agnihotri, O., Sushmita, Sabharwal, N., Jha, A., Singh, M., Kumar, P., Kaur, I., **Marwah, R. G.,** Mongia, G. and Kapoor, A. (2016). Journal of Energy Research and Environmental Technology (JERET), 3(2), 127-130. (Conference proceeding publication)
- Anand, P., Saxena, R. K. & **Marwah, R. G.** (2011). A novel downstream process for 1,3-propanediol from glycerol-based fermentation. Applied Microbiology and Biotechnology, *90*(4), 1267-1276. https://doi.org/10.1007/s00253-011-3161-2
- Kaushik, R., **Marwah, R. G**., Gupta, P., Saran, S., Saso, L., Parmar, V. S. & Saxena, R. K. (2010). Optimization of Lipase Production from *Aspergillus terreus* by Response Surface Methodology and Its Potential for Synthesis of Partial Glycerides Under Solvent Free Conditions. Indian Journal of Microbiology. 50(4), 456-462. https://doi.org/10.1007/s12088-011-0100-y
- Srinivasan, S., Gupta, S., **Marwah R**., Manisankar, P. & Kumar, R. (2010). Synthesis, characterization and *in vitro* biological studies of novel N-aryl piperazinyl fluoroquinolones. Research Journal of Pharmaceutical, Biological and Chemical Sciences *1*(3), 727-737.
- Fatope, M. O., Varma, G. B., Al-Azri, N. M., **Marwah, R. G**. & Nair, R. S. (2010). ent-Kaurine diterpenoids from *Blepharispermum hirtum*. Chemistry and Biodiversity. *7*(7), 1862-1870. https://doi.org/10.1002/cbdv.200900389

- Fatope, M. O., **Marwah, RG**, Al Hadhrami, NM, Onifade, AK & Williams, JR. (2008). Identification of the Chemotypes of *Ocimum forskolei* and *Ocimum basilicum* by NMR Spectroscopy. Chemistry and Biodiversity *5*(11): 2457-63. https://doi.org/10.1002/cbdv.200890211
- **Marwah, R. G**., Fatope M. O., Deadman, M. L., Al-Maqbali, Y. M. & Husband, J. (2007). Musanahol: a new aureonitol-related metabolite from a *Chaetomium* sp. Tetrahedron *63*(34), 8174-8180. https://doi.org/10.1016/j.tet.2007.05.119
- **Marwah, R. G**., Fatope M. O., Deadman, M. L., Ochei, J. E. & Al-Saidi, S. H. (2007) Antimicrobial activity and the major components of the essential oil of *Plectranthus cylindraceus*. Journal of Applied Microbiology *103*(4), 1220-1226. https://doi.org/10.1111/j.1365-2672.2007.03365.x
- **Marwah, R. G**., Fatope M. O., Al-Mahrooqi R., Varma G. B., Al-Abadi, H. &Al-Burtamani S.K.S. (2007) Antioxidant capacity of some edible and wound healing plants in Oman. Food Chemistry *101*(2), 465-470. https://doi.org/10.1016/J.FOODCHEM.2006.02.001
- Varma, G. B., Fatope, M. O., **Marwah, R. G**., Deadman M. E. & Al-Rawahi F. K. (2006) Production of phenylacetic acid derivatives and 4-epiradicinol in culture by *Curvularia lunata,* Phytochemistry *67*(17), 1925-1930. https://doi.org/10.1016/j.phytochem.2006.05.032
- Suliman, F. O., Fatope M. O., Al-Saidi, S. H., Al-Kindy, S. & **Marwah R. G**. (2006) Composition and antimicrobial activity of essential oil of *Pluchea arabica*. from Oman. Flavour and Fragrance Journal *21*(3), 469-471. https://doi.org/10.1002/ffj.1616
- Fatope, M. O., **Marwah, R. G**., Onifade, A. K., Ochei, J. & Al Mahrooqi, Y. (2006) 13C NMR analysis and antifungal and insecticidal activities of Oman Dill Herb Oil. Pharmaceutical Biology *44*(1), 44-49. https://doi.org/10.1080/13880200500530716
- **Gulati, R**. Isar. J, Kumar, V., Prasad, A.K., Parmar, V.S. & Saxena, R.K. (2005) Production of a novel alkaline lipase from *Fusarium globulosum* (FGL) produced using neem oil and its applications. Pure and Applied Chemistry *77*(1), 251-262. https://doi.org/10.1351/pac200577010251
- Al-Burtamani, S. K. S., Fatope, M. O., **Marwah, R. G**., Onifade, A. K. & Al-Saidi, S. H. (2005) Chemical composition, antibacterial and antifungal activities of the essential oil of *Haplophyllum tuberculatum* from Oman. Journal of Ethnopharmacology *96*(1-2), 107-112. https://doi.org/10.1016/j.jep.2004.08.039
- Fatope, M. O., Nair, R. S., **Marwah, R. G**. & Al-Nadhiri, H. H. S. (2004) New sesquiterpenes from *Pluchea arabica*. Journal of Natural Products *67*(11), 1925-1928. https://doi.org/10.1021/np040054c
- **Marwah, R**., Arya, P., Malhotra, B., Prasad, A. K., Saxena, R. K., Kumar, J., Watterson, A. C. & Parmar, V. S. (2003). Novel biocatalytic esterification reactions on fatty acids: Synthesis of sorbitol 1(6) - monostearate. Sukh Dev ARKIVOC 159-170. https://doi.org/10.3998/ark.5550190.0004.316
- Kidwai, M., Dave, B., Bhushan, K. R., Misra, P., Saxena, R. K., Gupta, R., **Gulati, R**. & Singh, M. (2002). Deacetylation of cephalosporins by lipase catalysis and microwave assisted transformation on a solid support. Biocatalysis and Biotransformation. *20*(5), 377-379. https://doi.org/10.1080/10242420290006710
- **Gulati, R**., Saxena, R. K. & Gupta, R. (2002) Fermentation waste of *Aspergillus terreus*: a potential copper biosorbent. World Journal of Microbiology and Biotechnology *18*(5), 397-401. https://doi.org/10.1023/A:1015540921432
- **Gulati, R**., Bhattacharya A., Prasad, A.K., Gupta R, Parmar, V.S., & Saxena, R.K. (2001) Biocatalytic potential of *Fusarium globulosum* lipase in selective acetylation / deacetylation reactions and in ester synthesis. Journal of Applied Microbiology *90*(4), 1-5. https://doi.org/10.1046/j.1365-2672.2001.01286.x

- Saxena, R. K., Sangeetha, L., Vohra, A., Gupta, R. & **Gulati, R**. (2001) Induction and mass sporulation in lignin degrading fungus *Cereporiopsis subvermispora* for its potential usage in pulp and paper industry. Current Science *81*(5): 591-594. https://www.jstor.org/stable/24105897
- Saxena, R. K., Gupta, R., Saxena, S. and **Gulati, R**. (2000). Role of fungal enzymes in food processing. In: *Applied Mycology and Biotechnology, food and fungi- principles, techniques and process applications. Volume 1*. Elsevier Science Series (eds. G.G. Khachatourians and D.K. Arora). https://doi.org/10.1016/S1874-5334(01)80015-0
- **Gulati, R**., Saxena, R. K. & Gupta, R. (2000) Fermentation and downstream processing of lipase from *Aspergillus terreus*. Process Biochemistry *36*(1-2), 149-155. http://doi.org/10.1016/S0032-9592(00)00201-6
- **Gulati, R**., Saxena, R. K., Gupta, R., Yadav, R. P. & Davidson, W. S. (1999). Parametric optimisation for *Aspergillus terreus* lipase production and its potential in ester synthesis. Process Biochemistry *35*(5), 459-464. https://doi.org/10.1016/S0032-9592(99)00090-4
- **Gulati, R**., Saxena, R. K. & Gupta, R. (1999) Fermentation waste of *Aspergillus terreus*: a promising copper bio-indicator. Current Science *77*(10), 1359-1360. https://www.jstor.org/stable/24104438
- Saxena, R. K., Ghosh, P. K., Gupta, R., Davidson, W. S., Bradoo, S. and **Gulati, R**. (1999) Microbial lipases; potential biocatalysts for the future industry. Current Science *77*(1), 101-115. https://www.jstor.org/stable/24102918
- **Gulati, R**., Saxena, R. K. & Gupta, R. (1997). A rapid plate assay for screening L-asparaginase producing microorganisms. Letters in Applied Microbiology *24*, 23-26. https://doi.org/10.1046/j.1472-765X.1997.00331.x
- Book chapter
  Saxena, R. K., Gupta, R., Saxena, S. and Gulati, R. (2000). Role of fungal enzymes in food processing. In: Applied Mycology and Biotechnology, food and fungi- principles, techniques and process applications. Volume 1. Elsevier Science Series (eds. G.G. Khachatourians and D.K. Arora). https://doi.org/10.1016/S1874-5334(01)80015-0

D. Selected Conference presentations/Invited talks

- Three of my undergraduate students Shaswat nair, Nandini Gupta, and Vasu madan presented a poster titled '**A highly hydrophobic and architecturally complex biofilm of *Bacillus paralicheniformis* bcasdu2018/01 and its potential biotechnological application in removal of toxic dyes',** on the occasion of National Science Day on 28 February 2025, celebrated at the National Institute of Immunology, New Delhi. **The poster was awarded the first prize.**
- One of my undergraduate students Kaushik Poddar presented the poster titled '**Understanding the structural and potential biotechnological prospects of a highly robust gamma polyglutamic acid-rich biofilm produced by a novel strain of *Bacillus paralicheniformis***' for our group's research work on Biofilms at the International Conference of Association of Microbiologists of India, held at Maharishi Dayanand University, Rohtak, India from 2-4 February 2023. (**Best poster award received under Food & Industrial Microbiology category).**
- Two of my undergraduate students, Tanu Bansal and Anirban Adhikary presented the poster titled '***A Robust Biofilm forming strain of Bacillus licheniformis isolated from air: studies related to colony morphology and antibiotic resistance patterns***' in the International Conference on "Challenging Environment: Understanding the Emerging Challenges and their Management strategies" at Kalindi College, University of Delhi from 10-12 April, 2019. (**The poster was awarded second prize in the conference).**

- Oral presentation titled '***Green energy generation and waste water treatment using Microbial Fuel Cell Technology'*** at National Conference on 'Clean and Green Energy: The Chemical and Environmental aspects' Organised by Department of Chemistry, Bhaskaracharya College of Applied Sciences, on 16-17 February, 2017.
- Poster presentation titled 'Fermentation waste biomass of *Aspergillus terreus*: A potential copper bioindicator and a biosorbent'. (2000). International conference on microbial biotechnology: trade and public policy held at Department of Microbiology, Osmania University, Hyderabad**. (Best poster Award)**
- Oral presentation titled 'Low temperature lipase from *Fusarium globulosum* for house-hold detergents'. (2000). Oral presentation during 'Short advanced course on lipases: from structure to applications in food and chemical industry' held from 6-7, April, 2000 at The Wageningen University, The Netherlands. **(Travel grant received from Council of Scientific research and Department of Science and Technology and DST, Govt. of India)**
- Poster presentation titled 'Production of *Fusarium globulosum* lipase and its application for selective hydrolysis reactions'. Anupam Bhattacharya, **Ruchi Gulati**, V.S. Parmar and R.K. Saxena (2000). International symposium on trends in medicinal chemistry and biocatalysis, Department of Chemistry, University of Delhi, Delhi. **(Best poster award)**
- Invited as **Resource Person** in the FDP held in Daulat Ram College, University of Delhi, held on 19th-20th March 2018 for providing practical training to teachers and students in the area of ***"Industrial and Environmental Microbiology"*** **as part of B. Sc. (H) Botany curriculum.**
- **Resource person** for the first Laboratory Staff Skill Development inter-departmental workshop on 'Various Culture Transfer Techniques' held on December 15, 2014 at Bhaskaracharya College of Applied Sciences .

E. Various Co-curricular activities organized (Selected ones)

- Convener for Webinar Series titled ***'Advances in Microbiology: An Interdisciplinary Approach'*** cum ***Alumni Interaction Day*** as part of Microquest 2021 from 9-26, March 2021.
- Coordinator for Webinar Series 2020 titled ***'Covid-19 pandemic-the road map to recovery'*** that commenced on 23 May 2020 and ended on 25 July 2020 and 12 talks on various aspects of managing covid-19 pandemic were arranged.
- Coordinator for One day seminar titled ***'Advancements in Molecular Microbiology in the Revolutionary Omics Era'*** and **Microquest 2020,** held on 20 February, 2020.
- Coordinator for organizing a four-day Virtual Learning program titled ***'National Science Series: Igniting Young Minds'*** from 4-7 August 2020.
- Coordinator for organizing Distinguished Alumni Interactive Lecture Series tilted ***'Careers in Microbiology & Beyond'*** from 23 October 2019- 15 February 2020.
- Convener for the National Conference on '***Advances in Interdisciplinary Microbiology: Perspectives from Academia and Industry'*** on 13-14 March 2018 as the culmination of the department's 10th anniversary celebrations and as part of Microquest 2018.
- Coordinator for the Symposium on **"Science empowering women—Women empowering science"** held on 27 March, 2017.
- Coordinator, A one-day symposium on ***"Antibiotic resistance: a major global threat"*** on 16 March, 2016, under the aegis of Star college Scheme of the college.
- Coordinator, A one-day symposium on ***"Biofuels: an alternative and non-conventional energy source for future"*** **on February 2, 2015,** under the aegis of Star college Scheme of the college.
- Coordinator, National Symposium on ***"Infectious diseases: advancements in diagnosis, therapeutics and vaccines"*** on 20th and 21st March, 2014.

- Coordinator for organizing **MICROOQUEST**, Annual Microbiology festival of Sukshmjeev, Microbiology Society during which talks by Dr. Ananda Mohan Chakraborty (USA) and Dr. Benjamin Pushpraj (Italy) were organized along with various co-curricular activities for students in November 2009.

Memberships

- Member of American Society for Microbiology since 11/8/21 till 31 December 2022, Membership ID 200314931
- Life membership of Society of Biological Chemists, India, Membership No. 2783
- Life membership of Indian Science Congress Association, Membership No. L26365
- Life membership of Microbiologist Society of India.

Research Collaborators

1. **Prof. Deepti Jain**, Structural Biology Laboratory, Regional Centre for Biotechnology, Faridabad, Haryana, India.
2. **Prof. Andrew McBain**, Faculty of Biology, Medicine and Health, University of Manchester, United Kingdom. **I have been a visiting academic in Prof. Andrew J McBain's lab since January 2023 at the University of Manchester, United Kingdom.** We are collaborating for research and publishing together, specifically working to understand the formation of dry surface biofilms, that are significant from a healthcare perspective.

References

1. Prof. R. K. Saxena, (Ph.D. Supervisor), snow retired from the Department of Microbiology, University of Delhi, South Campus, New Delhi- 110 021. E mail: rksmicro@yahoo.co.in

2. Prof. Majek O. Fatope, (Postdoctoral Project Principal Investigator), now retired from the Department of Chemistry, College of Science, Sultan Qaboos University, Muscat, Sultanate of Oman. E mail: majekmof@gmail.com

3. Dr. Purnima Anand (Collleague & Research Collaborator), Associate Professor, Department of Microbiology, Bhaskaracharya College of Applied Sciences, University of Delhi, Dwarka, Sector 2, Phase 1, New Delhi-110075, India. Email: purnima.anand@bcas.du.ac.in

4. Prof. Andrew McBain, Professor of Microbiology, Faculty of Biology, Medicine and Health, University of Manchester, United Kingdom. Email: andrew.mcbain@manchester.ac.uk

Profile Links:

Google Scholar: https://scholar.google.com/citations?hl=en&user=CDHf6asAAAAJ
ORCID: https://orcid.org/0000-0001-8945-7055
Web of Science: AAS-5436-2021