

Muhammad Israr, PhD

HEC Approved Supervisor
Assistant Professor,
Department of Biology,
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Research Interest

- **Molecular Enzymology:** Enzyme Engineering, Enzymatic Characterization, Catalytic Mechanism Analysis: cloning, expression, purification of enzyme protein, characterization of enzymatic properties, combined with rational or directed evolution technology (Site-directed mutagenesis, Iterative Saturation Mutagenesis), Homology Modeling, Multiple Sequence Alignment and protein crystal structure analysis to elucidate its catalytic mechanism.
- **Directed Evolution and Application of Enzyme Protein:** based on the three- dimensional structural information of enzyme protein, using directed evolution technology to obtain enzyme protein with high catalytic efficiency and good stability to serve the biocatalytic industry
- **Elucidation of the Molecular Mechanism of Alzheimer's Disease.**
- **Epidemiologic Studies on Hepatitis B and Hepatitis C viruses.**

Educational Background

Postdoctoral Fellowship (IPFP) under NAHE Islamabad

Department of Biology, The University of Haripur, KPK, Pakistan

From November 2020 to November 2021.

Project secured: One Million (Rs)

Project title: Molecular Cloning and Biochemical Characterization of UDP-MurNAc-L- alanyl-D-glutamate: L-Lysine ligase (MurE) from pathogenic bacteria for Inhibitors Development

Remarks: in progress

Ph.D. (Biochemistry and Molecular Biology)

School of Life Science, Hebei Normal University, Shijiazhuang, China. (Sep 2016- July 2019).

Dissertation title: Molecular Studies on the Catalytic Properties of D-amino Acid Metabolic Enzymes.

Sub-title 1: Biochemical Characterization and Mutational Analysis of Alanine Racemase from *Clostridium perfringens*.

Sub-title 2: Enhancement in the catalytic activity of D-amino Acid Oxidase from *Arthrobacter protophormiae* (DSM 20168) through site-directed mutagenesis.

Sub-title 3: Improvement in the catalytic activity and thermal stability of Alanine Racemase from *Thermoanaerobacter tencongenesis* MB4 through directed evolution.

Master (Chemistry with Specialization in Biochemistry)

Institute of Chemical Science, University of Peshawar, K.P.K, Pakistan (2008-2011).

Remarks: Division 1st

Thesis title: Epidemiologic study on Hepatitis B and C virus among the general population of district Peshawar, Khyber Pakhtunkhwa, Pakistan.

Bachelor (Chemistry, Botany, Zoology)

Government Post Graduate College, Swabi, KPK, Pakistan (2006-2008).

Remarks: Division 1st

Bachelor of Education (B.Ed.)

Aziz College of Education Yar Hussain, Swabi, KPK Pakistan (2013-2014)

Remarks: Division 1st

Intermediate (FSc) (Chemistry, Biology, Physics)

Government Post Graduate College, Swabi, KPK, Pakistan (2004-2006).

Remarks: Division 1st

Intermediate (SSC) (Chemistry, Biology, Physics)

Government High School Dobian, Swabi, KPK, Pakistan (2003-2004).

Remarks: Division 1st

Employment

- Assistant Professor: Department of Biology, The University of Haripur, Haripur.
(1st December 2021 to date)
- Assistant Professor (IPFP Fellow): Department of Biology, The University of Haripur,
(November 2020 to November 2021)
- Research Assistant: College of Life Sciences, Hebei Normal University, China.
(September 2018 to May 2019)
- Lecturer: Government Degree College, Shewa, Swabi
(October 2014 to August 2016)

Research Experience

My scientific research & innovation development was started in 2010. Until I have worked in multi-directions and wish to further carry on my research related to molecular Enzymology

and protein engineering to serve the bio-catalytic industries. A summary of my research work and future interest (not specific for a new group) is given below.

2016 Onward:

- Gene cloning and construction of expression plasmids
- Mutational analysis of enzymes using Alanine Scanning, Site-Directed Mutagenesis (SM) and Iterative saturation mutagenesis (ISM)
- Protein expression and purification
- Biochemical characterizations of enzyme proteins
- Kinetic characterizations of enzyme proteins
- Sequence and modeling analysis of enzyme proteins
- Enhancement in the catalytic activity, substrate specificity and thermal stability of Alanine Racemase enzymes and D-amino acid oxidase enzymes by using biotechnological techniques to serve the bio-catalytic industries.

2010- 2016

- Characterization of Hepatitis C and B virus through ICT, ELISA and RT-PCR,
- Epidemiology and risk factors of Hepatitis B and C among blood donors and the general population
- Correlation between ELISA and RT-PCR for Hepatitis C positive samples.

Involved in group research work:

- Elucidating the molecular mechanism of Alzheimer disease
- Exploring the Effect of Anesthetic Sevoflurane on Iron Homeostasis and Toxicity
- Characterization of magnesium, zinc and iron sulfates for thermochemical storage

Research Projects Secured/Completed

- One Million PKR Research Grant as a Principal-Investigator under Start-Up Research Grant Program (SRGP) for IPFP (Phase-II), Project Title: Molecular Cloning and Biochemical Characterization of UDP-MurNAc-L-alanyl-D-glutamate: L-Lysine ligase (MurE) from pathogenic bacteria for Inhibitors Development. (Project ID 205/IPFP-II (Batch-I)/SRGP/NAHE/HEC/2020/238).
- Completed 3.2 Million RMB Research Grant as a Co-Principal Investigator from Foundation of Hebei Normal University, China. Project Title: Isolation and Synthesis Process Optimization of Biosynthetic Alanine Racemase. (Project ID: L2017K07).

Research Publications

Papers Published/Accepted

- **Muhammad Israr**, Guoping Lv, Shujing Xu, Yunhe Li, Shengting ding, Baohua Zhao, Jiansong Ju, Biochemical characterization and mutational analysis of alanine racemase from *Clostridium perfringens*, **Journal of Bioscience and Bioengineering**, <https://doi.org/10.1016/j.jbiosc.2019.02.003>. (IF 2.89)
- Muhammad Tariq, **Muhammad Israr***, Muslim Raza*, Bashir Ahmad, Azizullah Azizullah, Shafiq Ur Rehman, Muhammad Faheem, Xinxiao Sun, Qipeng Yuan*. Engineering of Phenylalanine Dehydrogenase from *Thermoactinomyces Intermedius* for the Production of a novel Homoglutamate. **PLOS ONE (Accepted)**.
- Syeda Asma Bano, **Muhammad Israr** et al. Detection of Microorganisms with antibacterial activities from different industrial wastes and GC-MS analysis of crude

microbial extracts. **Brazilian Journal of Biology.** (IF 1.65)

- **Muhammad Israr***, Fawad Ali, Arif Nawaz, Muhammad Idrees, Aishma Khattak, Shafiq Ur Rehman, Azizullah Azizullah, Bashir Ahmad, Syeda Asma Bano, Rashid Iqbal. Seroepidemiology and Associated Risk Factors of Hepatitis B and C Virus Infections among Pregnant Women Attending Maternity Wards at Two Hospitals in Swabi Khyber Pakhtunkhwa Pakistan. **PLOS ONE** 16(8): e0255189. <https://doi.org/10.1371/journal.pone.0255189> . (IF 3.24)
- Xing Ge, Ying Zhang, Yong Zuo, **Muhammad Israr**, Bowen Li, Peng Yu, Guofen Gao, Yanzhong Chang, Zhenhua Shi, Transcriptomic analysis reveals the molecular mechanism of Alzheimer-related neuropathology induced by sevoflurane in mice, **Journal of Cellular Biochemistry**, [https://doi: 10.1002/jcb.29020](https://doi.org/10.1002/jcb.29020). (IF 4.429)
- Bashir Ahmad, Yaser Gamallat, Muhammad Fiaz Khan, Syed Riaz Uddin, **Muhammad Israr**, Manzoor Ahmad, Naeem Tahir et al. Natural Polyphyllins (I, II, D, VI, VII) Reverses Cancer Through Apoptosis, Autophagy, Mitophagy, Inflammation, and Necroptosis. **Onco Targets and Therapy.** (14):1821-1841. (IF 4.147)
- Najeeb Ullah, Syeda Asma Bano, Ume Habiba, Maimoona Sabir, Andleeb Akhtar, Samreen Ramzan, Ayesha Shoukat, **Muhammad Israr**, Sher Shah, Syed Moazzam Nizami, Majid Hussain. Environmental impacts, water footprint and cumulative energy demand of match industry in Pakistan. **PLOS ONE.** (IF 3.24) <https://www.researchgate.net/deref/https%3A%2F%2Fdoi.org%2F10.1371%2Fjournal.pone.0251928>
- Ata Ur Rehman, Asif Hayat, Adnan Munis, Tianyu Zhao, **Muhammad Israr**, Zheng Maosheng, Characterization of magnesium, zinc and iron sulfates for thermochemical storage. **Proceedings of the Institution of Civil Engineers- Energy**, <https://doi.org/10.1680/jener.19.00018>. (IF 1.121)
- Muhammad Saqlain Zaheer, Hafiz Haider Ali, Walid Soufian, Rashid Iqbal, Muhammad Habi-ur-Rahman, **Muhammad Israr**, Ayman EL Sabagh. Potential effect of biochar application for improving wheat (*Triticum aestivum L.*) growth and soil biochemical properties under drought stress conditions. **Land.** <https://www.mdpi.com/2073-445X/10/11/1125> . (IF 3.39)
- Meher Hassan, **Muhammad Israr***, Simeen Mansoor, Shafiq Ur Rehman, Azizullah Azizullah. Alleviation of genotoxicity and oxidative stress caused by cadmium in mung bean seedlings by priming effect of phytohormones and proline. **PLOS ONE.** <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0257924>. (IF 3.24)
- Fawad Ali, **Muhammad Israr***, Shafiq Ur Rehman, Azizullah Azizullah, Hussain Gulab, Muhammad Idrees, Rashid Iqbal, Aishma Khattak, Majid Hussain, Fahad Mohammed Al-Zuaibr. Health risk assessment of heavy metals via consumption of dietary vegetables using wastewater for irrigation in Swabi, Khyber Pakhtunkhwa, Pakistan. **PLOS ONE** 16(8): e0255853. <https://doi.org/10.1371/journal.pone.0255853> (IF 3.24)

- **Muhammad Israr***, Fawad Ali, Murtala Muhammad, Noor Bahadar, Seroprevalence and risk factors of hepatitis B virus among blood donors in district Charsadda Khyber Pakhtunkhwa Pakistan, **Journal of Pure and Applied Biology**, 6(2): 669-675, June 2017.
- Noor Bahadar, Fawad Ali, **Muhammad Israr**, Shabeer Ahmad, The correlation between RT-PCR and ELISA assay on hepatitis C positive serum samples, **Journal of Pure and Applied Biology**, 5(4): 689-694, December 2016
- **Muhammad Israr***, Fawad Ali, Aziz Ullah, Shafiq Ur Rehman, Arif Nawaz, Rashid Iqbal, Shakir Ullah, Zobia Noreen. Immunochromatographic Test and Third Generation ELISA for Elucidating the Existence and Risk Factors of Anti-HCV Antibodies among Blood Donors from Swabi Pakistan. **Abasyn Journal of Life Science**. 2020, 3 (2): 138-144.
- Kanwar Muhammad Raheel Mehboob, Rashid Iqbal, **Muhammad Israr**, Jaweria Shamshad, Umair Riaz, Muhammad Habib-ur-Rahman, Fawad Ali, Arif Nawaz, Maliha Sarfraz, Abdul Waheed, Muhammad Tahir Khan and Muhammad Aslam. Assessment of the Consequences of Heat Changes on Cotton Cultivars Growth, Phenology and Yield at Different Sowing Regimes. **Pakistan Journal of Agricultural Research**, 33, 4: 759-769.
- Muhammad Idrees, **Muhammad Israr***, Saman Naveed, Bashir Ahmad, Muhammad Mukaram Shah, Imran Khan, Aishma Khattak. Frequency distribution of Diabetes Mellitus and Chronic Kidney Disease among General Population of Peshawar Khyber Pakhtunkhwa Pakistan. **Pakistan Journal of Zoology (Accepted)**.
- Imran Haider, Muhammad Aown Smmar Raza, Rashid Iqbal, Salman Ahmad, Muhammad Slman Ahmad, **Muhammad Israr**, Umair Riaz, Nasir Abbas, Salman Haider Abbasi. Alleviating the Drought Stress in Wheat (*Triticum aestivum* L.) by Foliar Application of Amino Acid and Yeast. **Pakistan Journal of Agricultural Research**. 34(1):239-246.

Papers in Progress (Submitted/Under review/ Writing)

- **Muhammad Israr***, Jing Bai, Bashir Ahmad, Dong Liu, Jiansong Ju, Aziz Ullah, Shafiq Ur Rahman, Umar Zeb, Baohua Zhao, Enhancement in the catalytic activity of D-amino acid oxidase from *Arthrobacter protophormiae* (DSM 20168) through site-directed mutagenesis. Under Review in **Journal of Biotechnology**.
- Faryal Saad, Sumaira Shams, **Muhammad Israr***, Sultan Ayaz, Noor ul Akbar, Adil Khan. Investigating the existence of IgG and IgM in Breast Feeding Mothers, infected with Cytomegalovirus by Enzyme-Linked Immunosorbent Assay (ELISA). Under Review in **Pakistan Journal of Zoology**.

- Aishma Khattak, Bashir Ahmad, **Muhammad Israr***, Muhammad Idrees. Preliminary Comparative Phytochemical Screening of *Quercus Semicarpifolia* Smith. Under Review in **Journal of Traditional Chinese Medical Sciences**.
- Aishma Khattak, Bashir Ahmad, **Muhammad Israr***, Syed Muhammad Mukarram Shah, Muhammad Idrees, Kishwar Sultana. Synthesis and Comparative Analysis of the Biological Activities of Phytogenic Silver Nano-particles from *Quercus Semicarpifolia* Smith with Plant Crude Extracts. Under Review in **Brazilian Journal of Biology**.
- Aishma Khattak, **Muhammad Israr***, Bashir Ahmad, Muhammad Idrees, Farhat Amin, Nousheen Bibi. Anti-nociceptive, anti-inflammatory and antipyretic activities of the extracts and plant-based silver nanoparticles of *Quercus semicarpifolia* smith. Under review in **IET Nano biotechnology**.
- **Muhammad Israr***, Shakir Ullah, Guojun Zheng, Aziz Ullah, Bashir Ahmad, Shafiq Ur Rehman. Enhancement in the catalytic activity of *Anabaena variabilis* phenylalanine ammonia-lyase (AvPAL) for the production of L-Phenylalanine using site-directed mutagenesis. Under review in **Biotechnology and Applied Biochemistry**.
- **Muhammad Israr**, Qing Jin, Jing Bai, Aziz Ullah, Bashir Ahmad, Umar Zeb, Shafiq Ur Rahman, Dong Liu, Jiansong Ju, **Baohua Zhao*** Improvement in the catalytic activity and thermal stability of Alanine Racemase from *Thermoanaerobacter tencongenesis* MB4 through iterative saturation mutagenesis, **Under review in Journal of Bioscience and Bioengineering**
- **Muhammad Israr***, Jiansong Ju, Baohua Zhao, D-amino acid metabolic enzymes: Functions and industrial application (review article). **Under review in Brazilian Journal of Biology**
- Sujjad Zaman, **Muhammad Israr***, Fawad Ali, Muhammad Akhlaq, Azizullah Azizullah, Shafiq Ur Rehman, Sajid Raza, Asif Nawaz. Compatibility study between Artemether Lumefantrine and Proposed Excipients used for Solid Unit Dosage Form. **Under review in PLOS ONE**

Students Supervision

Currently, supervising 2 MS/MPhil students and 10 BS students

Reviewer for International Journals

Reviewing articles for the following ISI Index journals

- Journal of Biochemistry and Biotechnology
- Pakistan Journal of Zoology
- Journal of Enzyme and Microbial Technology
- Journal of Biotechnology

International and National Conferences Attended

- 2nd Symposium on recent trends in Indigenous Chemical Research and Awareness on Data Presentation, Institute of Chemical Sciences, University of Peshawar Pakistan held at Baragali Summer Campus during July 1-5, 2012.
- 11th International and 23rd National Chemistry Conference Organized by the National Centre of Excellence in the Physical Chemistry University of Peshawar. October 15-17, 2012.
- 13th National Symposium Frontiers in Physics, Organized by University of Peshawar Pakistan, December 19-21, 2012.
- 4th Spring Research Poster Exhibition Organized by Institute of Chemical Sciences, University of Peshawar Pakistan, April 11, 2013. **(Participated as a presenter)**.
- 10th International Symposium on Analytical and Environmental Chemistry Organized by National Centre of Excellence in Analytical Chemistry, University of Sindh, Jamshoro Pakistan. December 2-4 2013.
- International Conference on Physical and Environmental Chemistry Organized by National Centre of Excellence in the Physical Chemistry University of Peshawar Pakistan. Held at Hotel Elites Natia Gali Pakistan. September 9-11 2013.
- 12th Symposium on Biochemistry and Molecular Biology Organized by School of Life Science, Hebei Normal University Shijiazhuang China. April 10, 2018.
- 1st International Symposium on Current Trends and Future Perspective in Botanical Research Organized by the University of Okara. November 10, 2020.
- 1st Annual Natural Products Exhibition-2021. Organized by Department of Botany, University of Okara.

International and National Workshops and Exhibitions Attended

- China-Pakistan Economic Corridor (CPEC) Workshop Organized by College of International Culture Exchange, Hebei Normal University, Shijiazhuang China May 15, 2018.
- Chinese Cultural Exhibition, Organized by the College of International Culture Exchange, Hebei Normal University, Shijiazhuang China. May 18, 2019.
- One Month National Faculty Development Program, Organized by National Academy of Higher Education (NAHE), Higher Education Commission (HEC) Islamabad. September-October 2020.

Technical skills

I have been through an intense phase of technical education during my academic career and based on this struggle, I have been ranked in the elite group of students evident by my good grades and awards in my entire academic career. I started serving my skill and knowledge from NPEC Rawat Islamabad as a junior lecturer in chemistry (Biochemistry + Organic chemistry, after a year I was promoted as a senior lecturer and HOD of the department, due to my leadership qualities I was assigned extra duties as the youngest hostel warden. My technical skills got polished during the past couple of years especially during the courses of my PhD degree at the School of Life Science, Hebei Normal University, Shijiazhuang China. I gained a great deal of theoretical and practical insight into both academic and personal career development. During my studies, I completed a research project as Co-Principal Investigator in which I design and constructed several mutated enzymes (Alanine Racemase and D-amino acid oxidase) explored the catalytic mechanism of important residues near the entryway corridor which put a great theoretical knowledge for enhancement the catalytic activity and thermal stability of the enzymes for the industrial purpose.

Furthermore, I used directed evolution methods for the improvement of catalytic activity and thermal stability of D-amino acid oxidase and Alanine Racemase. **During my stay at Hebei Normal University**, I worked with highly skilled Chinese and international scientists, which made me extremely efficient in approaching and solving interdisciplinary research problems. At Hebei Normal University, I co-supervised the industrial-scale projects and completed them in a short period. I have also made collaborative work in two projects for the elucidation of the molecular mechanism of Alzheimer's disease. During the projects, we explored the effect of Sevoflurane on Iron Homeostasis and Toxicity, and further, elucidate the molecular mechanism of Alzheimer-related neuropathology induced by Sevoflurane in mice using transcriptomic analysis.

Instrumental and Technical Skills

- Conventional PCR, Real-Time PCR, Gradient PCR
- ELISA, ICT
- Western Blotting
- Gel Electrophoresis
- SDS-PAGE
- HPLC

- FPLC
- ABI Sequencer (sequencing)
- Gene Cloning
- Protein expression and purification
- Kinetic characterization
- Cell culture
- Bioinformatics tools (Homology modeling, multiple sequences Alignment, Three-dimensional structural analyses using Swiss model, Swiss Dock, Zinc, PyMOL, Prochecker.

Language Skills

- Excellent speaking, writing, reading and listening skills in Pashto, Urdu, and English.
- Can speak the Chinese language.
- Can read and write the Arabic language

Awards and Honors

- Regular Top Position Holder in Primary, Middle and High School.
- Best English Speech Award during all government and private school competitions in 2004.
- 2nd Position in Biological Sciences at Graduation, Government Post Graduate College Swabi, KPK Pakistan. In 2008.
- 3rd Position in Biochemistry at Institute of Chemical Sciences in Master Final (based on overall score), University of Peshawar in 2011.
- Best Student Award of 10000 RMB in 2018 by Hebei Normal University, Shijiazhuang China.
- Granted Chinese Government Scholarship for PhD Studies in 2016.
- Won the Prize for 2nd Position in the Doctoral Forum within the series of “Learning in China” activities in the commemoration of the 40th anniversary of Reforms and Opening up Ceremony. Held in Chengdu, China 2018.
- Best International Researcher Award by College of International Cultural Exchange, Hebei Normal University Shijiazhuang China. October 29, 2018.
- Research Award by “Carrying the Flag World Records” based on excellent academic achievements (November 11, 2016)
- 2nd Position in the International Marathon of 5 kilometers running competition held in Hengshui Lake on September 24, 2016.

Countries Visited

- China (2016-2019), Doctoral Studies, Hebei Normal University, Shijiazhuang, China.
- Russia (2017), Holidays
- Malaysia (2018) Holidays
- Thailand (2018) Official Visit with Supervisor.
- Sri Lanka (2019) Holidays

Assets

- Good technical aptitude
- Work handling under pressure
- Good adaptation with the environment
- Quick learning at new skills
- Scientific tolerance and temperament
- Willing to learn and explore
- Working ability as an individual and in a team
- Patience and persistence
- Helping and guiding Colleagues even in a broad interdisciplinary filed

Hobbies and Personal Interest

My hobbies included surfing on the internet for searching new research ideas, Playing Football, cooking and jogging. I am interested to be a great scientist that my services provide benefits to the entire humanity

References

- **Prof. Shafiq Ur Rehman**
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