

KHADIJA BATOOL, Ph.D.

Molecular Biology | Gene Expression | Transcriptomics | Recombinant Protein Expression
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RESEARCH PROFILE

Molecular biologist with extensive research experience in molecular genetics, recombinant DNA technologies, gene-expression analysis, comparative transcriptomics, protein expression and purification, and development of experimental systems in non-model organisms. Experienced in cloning, plasmid and vector construction, transformation, transfection, PCR, RT-PCR, RT-qPCR, Western blotting, ELISA, SDS-PAGE, cell-based assays, and functional biological evaluation. Proven ability to independently design and optimize experiments, interpret complex molecular datasets, publish scientific findings, collaborate across multidisciplinary teams, and supervise junior researchers. Motivated to apply these transferable skills to filamentous fungal synthetic biology, heterologous protein production, transcriptional regulation, strain improvement, and sustainable cellular agriculture.

TECHNICAL EXPERTISE

Molecular Genetics & Gene Expression: DNA/RNA isolation; PCR; RT-PCR; RT-qPCR; molecular cloning; TA cloning; plasmid/vector construction; transformation; transfection; transduction; gene-expression analysis.

Transcriptomics & Data Analysis: Comparative transcriptomics; differential-expression interpretation; transcriptional-response analysis; fold-change and statistical interpretation; GraphPad Prism; SPSS; data organization and visualization.

Protein Expression & Characterization: Recombinant protein expression, extraction, purification, and characterization; SDS-PAGE; Western blot; Far-Western blot; ligand blot; ELISA; Bradford assay; SEAP assay.

Experimental Systems & Assays: Non-model biological systems; insect cell culture (Sf9, Tnms42, HzAM1, HzGUT-AW1, C6/36); infection assays; assay optimization; host-pathogen and host-microbe studies; mosquito and insect bioassays.

Research & Collaboration: Experimental design; protocol development; troubleshooting; scientific writing; manuscript and figure preparation; technical reporting; student supervision; multidisciplinary collaboration.

PROFESSIONAL EXPERIENCE

Postdoctoral Associate | Department of Entomology, University of Arizona | Tucson, AZ, USA | Oct 2025 - Present

- Conduct molecular research on tick-microbe and host-microbe interactions using nucleic-acid extraction, PCR, RT-qPCR, and gene-expression analysis.
- Develop and optimize experimental workflows for biological samples and host-associated microorganisms.
- Support experimental planning, assay troubleshooting, biological data interpretation, laboratory coordination, and collaborative scientific communication.
- Contribute to student training and laboratory research activities.

Postdoctoral Associate | Boyce Thompson Institute / Cornell University | Ithaca, NY, USA | Aug 2022 - Sep 2025

- Constructed fluorescent recombinant baculovirus vectors using Bac-to-Bac workflows and established infection-based expression systems in multiple insect cell lines.
- Designed and optimized experiments to evaluate vector performance, infection efficiency, host-system compatibility, and biological response.
- Performed viral stock generation, amplification, quantification, viral DNA preparation, endpoint dilution, titration, and molecular characterization.
- Used comparative transcriptomics to identify regulatory and host-response patterns associated with permissive and semi-permissive biological systems.
- Prepared manuscripts, scientific figures, technical reports, and presentations and collaborated with multidisciplinary researchers.

Postdoctoral Researcher | Southern Medical University | Guangzhou, China | Oct 2019 - Feb 2022

- Developed recombinant densovirus constructs carrying heterologous *Bacillus thuringiensis* toxin fragments and evaluated their biological performance.
- Applied cloning, recombinant DNA workflows, RT-PCR/RT-qPCR, cell-based analysis, growth-curve analysis, and mosquito bioassays.
- Optimized experimental conditions and assessed construct pathogenicity, efficacy, and stability in laboratory and applied biocontrol settings.
- Contributed to peer-reviewed publications through experimental design, data organization, figure preparation, and scientific writing.

Research Assistant | Key Laboratory of Biopesticide and Chemical Biology, FAFU | Fuzhou, China | Sep 2016 - Mar 2019

- Expressed, extracted, purified, and characterized recombinant proteins using bacterial expression systems.
- Performed cloning, PCR, RT-PCR, RT-qPCR, Western blotting, Far-Western blotting, ligand blotting, ELISA, SDS-PAGE, and biological assays.
- Investigated transcriptional responses, toxin-receptor interactions, and molecular mechanisms associated with insect susceptibility and resistance.
- Co-supervised undergraduate students in molecular biology techniques, protocol development, and laboratory research practices.

Teaching Assistant - Biocontrol Graduate Course | Fujian Agriculture and Forestry University | Fuzhou, China | Sep 2016 - Apr 2018

- Supported laboratory demonstrations, literature discussions, student research projects, presentations, and report evaluation.

EDUCATION

- Ph.D., Biochemistry and Molecular Biology, Fujian Agriculture and Forestry University, China, 2019. Dissertation: Mechanism of Lectin in *Aedes aegypti* against Cry toxin.
- M.Sc., Biology, Arid Agriculture University, Pakistan, 2014.
- B.Ed., Allama Iqbal Open University, Pakistan, 2013.
- B.Sc., Zoology, Botany, and Applied Psychology, University of the Punjab, Pakistan, 2010.

PUBLICATIONS

- **Khadija Batool**, Jeffrey Hodgson, Shan Wu, Zhangjun Fei, Gary W. Blissard. Comparative transcriptomics of baculovirus AcMNPV infections in permissive and semi-permissive lepidopteran hosts. *Journal of Virology*, submitted, 2026.
- Lu Yang, Yonghui Gao, Yulan Chen, Peiwen Liu, **Khadija Batool**, Jianxia Tang, Jinbao Gu. AAN ovary enriched piRNA controls ovarian development via Gadd45a–JNK - mediated nurse - cell apoptosis in the arbovirus vector *Aedes albopictus*. *Insect Science*, 2026.
- Aisha Lawan Idris, urayya Lawan Idris, **Khadija Batool**, Microbial-based biocontrol of *Fusarium* species causing wheat crown rot: current status and future prospects. *Biological Controls*, 2026.
- Surayya Lawan Idris, Aisha Lawan Idris, **Khadija Batool**. Bacilli: The keystone biocontrol agents eradicating phytopathogens. *Research & Reviews: Journal of Microbiology & Virology* 13, 2023.
- **Khadija Batool**, Jie Xiao, Siyu Zhao, Yu-Gu Xie, Jinbao Gu, Xiao-Guang Chen. Densovirus oil suspension significantly improves the efficacy and duration of killing the vector mosquito *Aedes albopictus*. *Viruses* 14, 2022.
- **Khadija Batool**, Intikhab Alam, Peiwen Liu, Zeng Shu, Siyu Zhao, Wenqiang Yang, Xiao Jie, Jinbao Gu, Xiao-Guang Chen. Recombinant mosquito densovirus with Bti toxins significantly improves pathogenicity against *Aedes albopictus*. *Toxins* 14, 2022.
- Intikhab Alam, **Khadija Batool**, Aisha Lawan Idris, Lingling Zhang. Role of lectin in response of *Aedes aegypti* against Bt toxin. *Frontiers in Immunology* 10, 2022. Equal contribution.
- Intikhab Alam, **Khadija Batool**, Aisha Lawan Idris, Xiong Guan, Lingling Zhang. Function of residue Leucine-6 in modulation Cry11Aa toxicity in *Aedes aegypti*. *Frontiers in Immunology* 13, 2022. Equal contribution.
- **Khadija Batool**, Intikhab Alam, Liang Jin, Jin Xu, Junxiang Wang, Enjiong Huang, Xiong Guan, Xiao-Qiang Yu, Lingling Zhang. CTLGA9 interacts with ALP1 and APN receptor to modulate Cry11Aa toxicity in *Aedes aegypti*. *Journal of Agricultural and Food Chemistry* 67, 2019.
- **Khadija Batool**, Intikhab Alam, Songqing Wu, Wencheng Liu, Guohui Zhao, Lingling Zhang. Transcriptomic analysis of *Aedes aegypti* in response to mosquitocidal *Bacillus thuringiensis* LLP29 toxin. *Scientific Reports* 8, 2018.
- **Khadija Batool**, Intikhab Alam, Guohui Zhao, Junxiang Wang, Jin Xu, Xiaoqiang Yu, Enjiong Huang, Xiong Guan, Lingling Zhang. C-Type Lectin-20 interacts with ALP1 receptor to reduce Cry toxicity in *Aedes aegypti*. *Toxins* 10, 2018.
- Jin Xu, Chenxu Wu, Zhaoxue Yang, Wencheng Liu, Hong Chen, **Khadija Batool**, Junmin Yao, Xiao Fan, Lei Xu, Xiong Guan, Lingling Zhang. RecG is involved with the resistance of Bt to UV. *Pesticide Biochemistry and Physiology* 167, 2020.
- Xiaohua Hu, Hong Chen, Jin Xu, Guohui Zhao, Xianhui Huang, Jiannan Liu, **Khadija Batool**, Chenxu Wu, Songqing Wu, Enjiong Huang, Juan Wu, Munmun Chowdhury, Jie Zhang, Xiong Guan, Xiao-Qiang Yu, Lingling Zhang. Function of *Aedes aegypti* galectin-6 in modulation of Cry11Aa toxicity. *Pesticide Biochemistry and Physiology* 162, 2019.
- Guihui Zhao, Jinan Liu, Xiaohua Hu, **Khadija Batool**, Liang Jin, Xiaoqiang Yu, Enjiong Huang, Xiong Guan, Lingling Zhang. Cloning, expression and activity of ATP-binding protein in *Bacillus thuringiensis* toxicity modulation against *Aedes aegypti*. *Parasites & Vectors* 12, 2019.
- Ling-Ling Zhang, Xiao-Hua Hu, Song-Qing Wu, **Khadija Batool**, Munmun Chowdhury, Yi Lin, Jie Zhang, Sarjeet S. Gill, Xiong Guan, Xiao-Qiang Yu. *Aedes aegypti* galectin competes with Cry11Aa for binding to ALP1 to modulate Cry toxicity. *Journal of Agricultural and Food Chemistry* 66, 2018.
- Ling-Ling Zhang, Xiaojuan Zhang, **Khadija Batool**, Xiaohua Hu, MingFeng Chen, Jin Xu, JunXiang Wang, XiaoHong Pan, TianPei Huang, Lei Xu, XiaoQiang Yu, Xiong Guan. Comparison and mechanism of the UV-resistant mosquitocidal Bt mutant LLP29-M19. *Journal of Medical Entomology* 55, 2018.
- Junxiang Wang, Guifang Lin, **Khadija Batool**, Shuaiqi Zhang, Mingfeng Chen, Jin Xu, Juan Wu, Liang Jin, Ivan Gelbic, Lei Xu, Lingling Zhang, Xiong Guan. Alimentary tract transcriptome analysis of the tea geometrid, *Ectropis obliqua* (Lepidoptera: Geometridae). *Journal of Economic Entomology* 111, 2018.
- Lingling Zhang, Guohui Zhao, Xiaohua Hu, Jiannan Liu, Mingwei Li, **Khadija Batool**, Mingfeng Chen, Junxiang Wang, Jin Xu, Tianpei Huang, Xiaohong Pan, Lei Xu, Xiao-Qiang Yu, Xiong Guan. Cry11Aa interacts with the ATP-binding protein from *Culex quinquefasciatus* to improve the toxicity. *Journal of Agricultural and Food Chemistry* 65, 2017.

AWARDS AND PROFESSIONAL RECOGNITION

- China Postdoctoral Science Foundation Fellowship, Grant 2020M672715.
- Ph.D. Scholarship, Fujian Agriculture and Forestry University, 2015-2019.
- First Position, Winter Symposium of College of Life Science, FAFU, 2019.
- Excellent Academic Report, Nankai University, 2018.
- Peer reviewer for Agrochemicals, Microorganisms, Genes, Pest Management Science, Journal of Agricultural and Food Chemistry, and PLOS ONE.
- Member, Entomological Society of America and American Society for Virology.

CERTIFICATIONS AND PROFESSIONAL TRAINING

- Basic Biosafety Protection Course, University of Arizona, 2026.
- Bloodborne Pathogens and Universal Precautions (OSHA Compliant), University of Arizona, 2025.
- Responsible Conduct of Research, CITI Program / Cornell University, 2022.
- Laboratory Safety, Hazard Communication, Chemical Waste Disposal, and Cryogen Safety, Cornell University, 2022.

RESEARCH INTERESTS

Industrial biotechnology; heterologous protein expression; molecular genetics; transcriptional regulation; comparative transcriptomics; recombinant DNA technology; strain engineering; sustainable biotechnology; cellular agriculture; protein production and characterization; non-model biological systems.

REFEREES

Contact information for two referees will be provided in the online application or upon request.