Nafiul Huda

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RESEARCH INTERESTS

Transcriptomics & Multi-Omic Data Integration • Sex-Differential Gene Regulation • Hormone Signaling & Gene Expression • Alternative Splicing & Isoform-Level Regulation • Evolutionary & Quantitative Genetics • Comparative Genomics • Functional Genomics in Model Organisms

I am a computational and molecular biologist with broad expertise in multi-omic experimental design, high-throughput sequencing, and integrative genomic analysis. My research spans multiple biological systems and scales: from human clinical cohort studies using patient-derived DNA samples during my Master's training, to large-scale functional genomics in *Drosophila melanogaster* during my doctoral work. My dissertation research leverages graded genetic perturbation of the insulin/insulin-like signaling (IIS) pathway to dissect the molecular basis of sex-differential gene expression across diverse genetic backgrounds, integrating bulk and single-cell RNA-seq, alternative splicing analysis, and quantitative genetic frameworks. I am equally comfortable at the bench and the command line, with a strong record of designing complex multifactor experiments, building reproducible analysis pipelines, and communicating findings across disciplinary audiences. I am eager to apply these skills to new biological systems and collaborative research environments.

EDUCATION

2026 (Expected) **Ph.D., Biological Sciences**
Auburn University, Auburn, AL
Dissertation: *Sex Differences in the Regulatory Architecture of a Pleiotropic Hormone Signaling Pathway: Insulin Signaling in Drosophila melanogaster*
Advisor: Dr. Rita M. Graze

2017 **M.Sc., Biochemistry and Molecular Biology**
University of Dhaka, Dhaka, Bangladesh
Thesis: *Analyses of genetic and allelic frequencies of mitochondrial NADH dehydrogenase subunit 2 and 3 among Bangladeshi population with type 2 diabetes.*
Advisor: Dr. A. H. M. Nurun Nabi

2015 **B.Sc., Biochemistry and Molecular Biology**
University of Dhaka, Dhaka, Bangladesh

RESEARCH EXPERIENCE

Summer 2026 **Graduate Research Assistant, Stevison Lab**
Department of Biological Sciences, Auburn University • PI: Dr. Laurie Stevison
NIH-R35: *"The Role of Oogenesis in Speciation"*

› Analyzing RNA sequencing and ATAC sequencing data from two *Drosophila* species to characterize the impact of thermal stress on oogenesis, integrating transcriptomic and chromatin-accessibility approaches.

› Performing single-cell RNA-seq library preparation for collaborative Graze lab samples, contributing to a first-authored publication.

2017–Present **Graduate Researcher, Graze Lab**

Department of Biological Sciences, Auburn University • Advisor: Dr. Rita M. Graze

Project: Mode of Sex-Differential Gene Regulation by Insulin Signaling

› Designed and analyzed a graded-perturbation RNA-seq experiment in adult *D. melanogaster* heads to test whether IIS regulates sex-differential expression through graded or threshold-like modes.

› Built a fully reproducible analysis pipeline incorporating DESeq2, robust outlier detection, dose-response clustering, and functional enrichment analysis.

Project: Sex-by-Genotype Effects of Insulin Signaling Across Diverse Genetic Backgrounds

› Designed a large multifactor RNA-seq experiment (genotype × sex × treatment × environment) across multiple DSPR-derived lines to dissect how natural genetic variation shapes sex-specific transcriptional responses.

› Performed differential expression and co-expression network analysis (WGCNA); computed cross-sex genetic correlations to quantify evolutionary constraint on hormone signaling targets.

Project: Isoform-Level Regulation of Sex-Differential Insulin Signaling Response

› Applied isoform-level quantification and alternative splicing analysis (rMATS turbo) across a 320-sample dataset to distinguish transcript abundance from splicing as drivers of sex-differential responses.

Additional projects: Sex-differential feeding and satiety responses to IIS perturbation; effects of glyphosate exposure on adult *Drosophila* behavior; single-cell RNA-seq library preparation from *Drosophila* heads using Illumina kits.

2016–2017 **Graduate Researcher, Population Genetics Lab**

Department of Biochemistry and Molecular Biology, University of Dhaka • Advisor: Dr. A. H. M. Nurun Nabi

› Investigated genetic associations of GATA3, mitochondrial NADH dehydrogenase subunits, and hTERT with type 2 diabetes risk in case-control cohorts using patient-derived human DNA samples from the Bangladeshi population.

› Performed SNP genotyping and telomere length quantification.

2015 **Undergraduate Research Assistant, Population Genetics Lab**

Department of Biochemistry and Molecular Biology, University of Dhaka

› Genotyped p53 polymorphisms in type 2 diabetic patients; performed bioinformatics annotation and sample collection.

PUBLICATIONS

Google Scholar: Citations: **74** • h-index: **5** • i10-index: **2**

Peer-Reviewed Journal Articles

2021 **Huda, N.**, Yasmin, T., & Nabi, A.H.M.N. MNS16A VNTR polymorphism of human telomerase gene: Elucidation of a gender-specific potential allele associated with type 2 diabetes in Bangladeshi population. *Journal of Diabetes and Its Complications*, 35(10), 108018. doi:10.1016/j.jdiacomp.2021.108018

2021 Goswami, A., **Huda, N.**, Yasmin, T., Hosen, M.I., Hasan, A.K.M.M., & Nabi, A.H.M.N. Association study of leukocyte telomere length and genetic polymorphism within hTERT promoter with type 2 diabetes in Bangladeshi population. *Molecular Biology Reports*, 48(1), 285–295. doi:10.1007/s11033-020-06045-7

2020 Bappy, H.M.J.A., Goswami, A., **Huda, N.**, Hosen, M.I., & Nabi, A.H.M.N. Gender-specific association of missense variant rs1805097 of IRS-2 and noncoding variant rs841853 of GLUT-1 genes with susceptibility to type 2 diabetes in Bangladeshi population. *Gene Reports*, 21, 100866.

2019 Saha, S.K., Akther, J., **Huda, N.**, Yasmin, T., Alam, M.S., Hosen, M.I., Hasan, A.K.M.M., & Nabi, A.H.M.N. Genetic association study of C5178A and G10398A mitochondrial DNA variants with type 2 diabetes in Bangladeshi population. *Meta Gene*, 19, 23–31.

2018 **Huda, N.**, Hosen, M.I., Yasmin, T., Sarkar, P.K., Hasan, A.K.M.M., & Nabi, A.H.M.N. Genetic variation of the transcription factor GATA3, not STAT4, is associated with the risk of type 2 diabetes in the Bangladeshi population. *PLOS ONE*, 13(7), e0198507. doi:10.1371/journal.pone.0198507

Manuscripts in Preparation *(Drafts available upon request)*

- **Huda, N.** & Graze, R.M. *Sexual Conflict, Regulatory Architecture, and Insulin/Insulin-Like Signaling in Drosophila melanogaster: A Framework for Understanding Sex-Differential Transcription.* (Review article)
- **Huda, N.** & Graze, R.M. *Dial or Switch? Insulin/Insulin-Like Signaling Drives Shared and Sex-Specific Transcriptional Responses in Drosophila melanogaster.* (Research article)
- **Huda, N.**, Rivera-Rincón, N., Khan, M., Graze, R.M., & Stevison, L.S. *Functional characterization of changes in expression and activation due to heat stress during oogenesis in Drosophila melanogaster and D. pseudoobscura.* (Research article; Hatch-seed and NIH MIRA support)

Conference Proceedings

2019 Saha, S.K., Hasib, M., Das, A., **Huda, N.**, Yasmin, T., Hosen, M.I., & Nabi, A.H.M.N. Evaluation of Whole Mitochondrial DNA Sequence in Healthy and Type 2 Diabetic Individuals with Reference to Bangladeshi Population. *Proceedings of the International Symposium on a New Era in Food Science and Technology.*

Other Publications

2018 **Huda, N.**, Hosen, M.I., Sarkar, P.K., Hasan, A.K.M.M., & Nabi, A.H.M.N. Genotyping of rs3824662 polymorphism in GATA3 gene by allele-specific PCR.

SCIENTIFIC PRESENTATIONS

2025 **66th Annual Drosophila Research Conference,** San Diego, CA
Huda, N., Graze, R.M. Natural variation in regulation of sexually dimorphic gene expression by the insulin signaling pathway in *Drosophila melanogaster*. *(Poster)*

2023 **64th Annual Drosophila Research Conference,** Chicago, IL
Huda, N., Graze, R.M. The role of insulin signaling in sex differences in gene expression. *(Poster)*

2021 **62nd Annual Drosophila Research Conference,** Online
Huda, N., Washburn, R.C., Williams, S.L., Graze, R.M. Sex differences in the effects of insulin signaling on food consumption in adult *Drosophila melanogaster*. *(Poster)*

2021 **COSAM Graduate Student Research Forum,** Auburn University
Huda, N. and Graze, R.M. The sex dimorphic effects of reduced insulin signaling on food consumption in adult *Drosophila melanogaster*. *(Talk)*

2019 **45th SEPEEG Conference,** Clemson Outdoor Lab, SC
Huda, N., Graze, R.M. The contribution of ecdysone signaling to sex differential gene expression in adult *Drosophila melanogaster*. *(Poster)*

TECHNICAL SKILLS

Molecular Biology: RNA and DNA extraction (genomic, plasmid, mitochondrial; Zymo Research, QIAGEN, RCC-5); pre-sequencing QC (Agilent 2100 TapeStation, Qubit); conventional PCR, ARMS-PCR, qPCR, colony PCR; RFLP genotyping; gel electrophoresis; SDS-PAGE; Western blotting; bacterial transformation and culture; plasmid isolation; restriction digestion; molecular cloning; site-directed mutagenesis; recombinant protein expression and purification; bulk and single-cell RNA-seq library preparation (Illumina); *Drosophila melanogaster* husbandry, crosses, and stock maintenance; BSL-2 lab work and animal cell culture.

Experimental Design: Multifactor designs (sex × genotype × treatment × environment); power analysis and sample-size estimation; biological controls; design for rigorous downstream statistical inference; experience with model-organism and population-level study designs.

Bioinformatics & Genomics: Bulk and single-cell RNA-seq QC, alignment, and quantification; differential expression (DESeq2, edgeR); contrast-based and multifactor modeling; k-means clustering; isoform-level analysis and alternative splicing (rMATS turbo); WGCNA co-expression networks; ATAC-seq data processing; SNP and genetic association analysis; functional enrichment and pathway analysis; NCBI, UniProt, KEGG.

Programming & Computing: R, Python, Bash, C; Linux command line and HPC environments; PowerShell; SPSS; Git and GitHub; reproducible workflow development; LaTeX and Markdown for technical writing.

Visualization: ggplot2, matplotlib, seaborn; PCA, heatmaps, network plots (R and Python); Adobe Photoshop and Illustrator for figure assembly.

TEACHING EXPERIENCE

2018–2026 **Graduate Teaching Assistant,** Auburn University
BIOL 1031/1037 Honors: Organismal Biology Laboratory
Large-enrollment undergraduate laboratory course; independently led 2 sections per semester (Fall and Spring), averaging 32 students per section and reaching approximately 64 students per term.

Delivered survey-based instruction spanning microbiology and microscopy, botany (nonvascular plants through angiosperms), and animal diversity (invertebrate phyla through vertebrate organ systems). Guided students through specimen identification, plant and animal dissection (including vertebrate rat dissection), pre-lab discussions, and hands-on reinforcement of lecture concepts. Managed all aspects of section administration: attendance, grading, and student support.

2018–2019 **Graduate Teaching Assistant,** Auburn University
BIOL 1021: Principles of Biology Laboratory
Introductory multi-section undergraduate laboratory course; independently managed full sections each semester.

Instructed sections covering the scientific method, evolutionary biology, and organismal diversity. Developed and implemented a novel laboratory exercise using active learning and structured discussion to communicate core evolutionary concepts. Guided students in scientific writing, quantitative data analysis, and hypothesis-driven inquiry.

2022, 2025 **Graduate Teaching Assistant,** Auburn University
BIOL 5521: Recombinant DNA Technology (with Dr. Rita M. Graze)
Upper-division course-based research experience (CURE); led 2 sections of approximately 20 students each, taught in Fall 2022 and Fall 2025.

Guided students through an end-to-end recombinant protein project: bacterial transformation, plasmid isolation, restriction digest, mutagenic PCR, site-directed mutagenesis, and SDS-PAGE validation. Supported experimental design, troubleshooting, and formal manuscript preparation.

MENTORING EXPERIENCE

2017–Present **Graduate Mentor, Graze Lab,** Auburn University
Mentored undergraduate research assistants, summer high-school researchers, and science fair participants. Trained mentees in the *Drosophila melanogaster* model system, experimental design, and reproducible data analysis. Worked to create an inclusive, encouraging environment that prepares students for independent research careers.

Auburn University Undergraduate Research Assistants Mentored

Bella Blair • Adrian Moolman • Thomas Krauss • Denise Horner • Bayley Atkins • Carter Zittrouer • Amanda (Mandy) Murdock • Michael Pursley • Michael Chen • Cat Dougherty • Aaron Aldaz • Luke Knight • Preston Luby • Justin Payne • Katie Finkelman • Anna Grace Brown.

Selected Mentee Presentations

2026 **Park, K.**, Huda, N., Graze, R.M. The Effect of Insulin-Like Peptides on Lipid Levels in *Drosophila*. Greater East Alabama Regional Science and Engineering Fair (GEARSEF). *(Poster)*

2025 **Kazmi, S.**, Huda, N., Graze, R.M. Genetic Variation in Heat Stress in *Drosophila melanogaster*. Alabama Science and Engineering Fair (ASEF), Auburn University. *(Poster)*

2023 **Park, I., Israil, R.**, Huda, N., Graze, R.M. The Effect of Roundup on *Drosophila* Feeding. CASE-REU Research Symposium, Auburn University. *(Poster)*

2019 **Ellison, Y., Cruz, J.H., Pursley, M.C.**, Huda, N., Graze, R.M. Endocrine Disruptor Has No Effect on Courtship Behaviors in *Drosophila melanogaster*. CASE-REU Research Symposium, Auburn University. *(Poster)*

AWARDS, HONORS & FELLOWSHIPS

2023 **COSAM Travel Grant** *(USD $500)*
College of Sciences and Mathematics, Auburn University

2016 **National Science and Technology (NST) Master's Fellowship** *(BDT 48,000; ∼USD $600 at time of award)*
Ministry of Science and Technology, Government of Bangladesh
Competitive national fellowship awarded to support graduate research.

2014 **Professor Syed Saleheen Qadri Scholarship** *(BDT 6,500/month × 8 months = BDT 52,000; ∼USD $670 at time of award)*
University of Dhaka, Bangladesh
Departmental scholarship for academic excellence in Biochemistry and Molecular Biology.

2008–2009 **Champion, Regional Mathematics Olympiad**
Bangladesh National Mathematical Olympiad

SERVICE & OUTREACH

2017–2025 **Demonstrator & Volunteer,** STEM Outreach, COSAM, Auburn University
Annual fall outreach (September–October) encouraging Alabama K–12 students to pursue careers in STEM.

› Demonstrator, "Fruit Fly Genetics," **Destination STEM Outreach Initiative** (September 2019).

› Demonstrator, "Fruit Fly Genetics," **STEM High School Visitation Day** — interactive displays for historically underrepresented high school juniors and seniors (October 2018).

› Volunteer/demonstrator at Destination STEM Expo in additional years (Fall 2017, 2020–2025).

2022–2024 **Volunteer, Summer Science Institute (SSI),** Auburn University
Summer K–12 enrichment program (volunteered each summer, 2022–2024); assisted with hands-on biology activities and mentored students through introductory laboratory experiences.

2024 **Judge,** Alabama Science and Engineering Fair (ASEF), Junior Division (Grades 6–8)

2023 **Judge,** Auburn University Research Student Symposium

2023 **Volunteer,** COSAM Graduate Student Research Forum, Auburn University

2022 **Volunteer,** COSAM Interdisciplinary Colloquium, Auburn University

2021–2022 **Vice President,** Bangladesh Student Organization (BSO), Auburn University

2015 **Organizing Assistant,** National Conference on the Role of Biotechnology in Industry
Bangladesh Society for Biochemistry and Molecular Biology

2013 **Outreach Volunteer,** Biotechnology Outreach Program
Department of Genetic Engineering and Biotechnology, University of Dhaka.

PROFESSIONAL MEMBERSHIPS

2019–Present Genetics Society of America (GSA)

2022–Present Society for Molecular Biology & Evolution (SMBE)