

## Md. Sayeed Abu Rayhan

Department of Biology

Indiana State University

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[Google Scholar](#), [ORCID](#)

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### EDUCATION

**Doctor of Philosophy (Ph.D.) in Biology** Expected May 2027

- Indiana State University
- PhD Candidate
- Focus: Investigating the mechanisms how mis-regulation of epigenetic modulator genes contribute to congenital heart defects (CHDs) via *Hox* control.
- Advisor: Dr. Kristopher Schwab

**Master of Science (M.Sc.) in Fish Genetics and Biotechnology** December 2020

- Khulna University, Bangladesh
- GPA: 3.69/4.00

**Bachelor of Science (Honors) in Fisheries and Marine Resource Technology** December 2018

- Khulna University, Bangladesh
  - GPA: 3.50/4.00, Last two years (60 credit): 3.74
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### RESEARCH EXPERIENCES

**Doctoral Researcher** August 2022-present

- “*Polycomb (Pc)* and *Polycomb group genes (PcG)* regulate cardiac patterning by repressing *trithorax (trx)* mediated *Hox* expression within *Drosophila melanogaster*”.
- Epigenetic modulator genes, e.g., *trx* and *Pc* play critical role in anterior-posterior patterning of the *Drosophila* heart tube. Mis-regulations in these genes contribute to congenital heart defects (CHDs).
- Immunofluorescence
- Cell and tissue culture
- Gene cloning
- **PI:** Dr. Kristopher Schwab

**Graduate Research Assistant** January 2019-Jan 2020

“Estimating peak breeding season, size at first maturity and variation in fecundity and egg-size at different sizes of Hilsa (*Tenualosa ilisha*)” **(MS Thesis)**

- Gonadosomatic Index (GSI)
- Reproductive Biology
- Fisheries management and conservation

Funded by: Khulna University Research Cell (<https://ric.ku.ac.bd/>). **PI:** Muhammad Yousuf Ali, Ph.D. [yousufku@gmail.com](mailto:yousufku@gmail.com)

and Ministry of Science and Technology, Bangladesh (<https://most.gov.bd/>), **PI:** Md. Sayeed Abu Rayhan

- Findings from this study validated the ban period of fishing imposed by the government of Bangladesh by confirming the peak breeding season of the national fish of Bangladesh.

**Undergraduate thesis work, Khulna University**

July 2018 – December 2018

“Identification, annotation and comparative analysis of HSP genes (Heat Shock Protein 70 and 90) from gill transcriptome of three freshwater crayfish”.

- Bioinformatics
- Functional and comparative genomics

PI: Muhammad Yousuf Ali, Ph.D. [yousufku@gmail.com](mailto:yousufku@gmail.com)

**Research Assistant**

January 2018-June 2018

“Genetic diversity of wild and hatchery populations of the stinging catfish (*Heteropneustes fossilis*) in Bangladesh using molecular markers.”

- RAPD
- Polymorphism
- Genetic divergence

**WORK EXPERIENCES**

**Graduate Teaching Assistant**

August 2022-present

- Department of Biology, Indiana State University
- Human Anatomy Laboratory (BIO-231L)
- Human Physiology Laboratory (BIO 241L)
- Teach around 70 Freshman and Sophomores each semester

**Scientific Officer (Scientist) (Full time, government officer)**

February 2020- June 2022

- Bangladesh Agricultural Research Institute (BARI)
- Integrated Farming System Expert (On Farm Research Division)  
<https://bari.gov.bd/>

Responsibilities

- Implication of Advanced Aquaculture Technologies in integrated agriculture system
- On field research, data collection, data analysis, report preparation and disseminate findings to the grassroot level farmers.
- Farmers Training and disease management of fish

**Undergraduate & High school students Research Mentoring**

August 2022-present

- Trained around 10 undergraduates and high school students to provide hands on experience in molecular biology and genetics.

Funded by: Khulna University Research Cell (<https://ric.ku.ac.bd/>). PI: Muhammad Yousuf Ali, Ph.D. [yousufku@gmail.com](mailto:yousufku@gmail.com)

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**PEER-REVIEWED PUBLICATIONS (Published)**

- Farmer AJ, Katariya R, Islam S, **Rayhan MSA**, Inlow MH, Ahmad SM, Schwab KR. *trithorax* is an essential regulator of cardiac *Hox* gene expression and anterior-posterior patterning of the

*Drosophila* embryonic heart tube. Biol Open. 2025 Apr 15;14(4): bio061919. doi: 10.1242/bio.061919.

- **Abu Rayhan MS**, Rahman MS, Bose PK, Sarower MG, Ali MY. Estimating peak breeding season, size at first maturity and variation in fecundity and egg-size at different sizes of Hilsa (*Tenualosa ilisha*). Heliyon. 2023 Aug 23;9(9): e19420. doi: 10.1016/j.heliyon. 2023.e19420.

### Manuscripts (In revision/In preparation)

- Ali, M.Y., **Rayhan, M.S.A.**, Rahman, M.B. (2024) Identification and comparative analysis of Heat Shock Protein genes Hsp70 and Hsp90 from gill transcriptomes of three Australian crayfish. Egyptian journal of Aquatic Biology and Fisheries (In revision).
- Raqib, A., **Rayhan, M.S.A.**, Sarower, M.G., Ali, M.Y., 2023. Developing a rapid and low-cost protocol for counting and measuring eggs of Hilsa fish (*Tenualosa ilisha*). (In preparation).

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### CONFERENCE RESEARCH PRESENTATIONS

**Rayhan, M.S.A.**, Islam, S., Farmer, A.J., Ahmad, S.M. & Schwab, K.R., 2025. *Polycomb (Pc) and Polycomb group genes (PcG) regulate cardiac patterning by repressing trithorax (trx)-mediated Hox expression in the embryonic heart tube*, presented at Midwest Drosophila Conference, 2025.

**Rayhan, M.S.A.**, Islam, S., Farmer, A.J., Ahmad, S.M. & Schwab, K.R., 2024. *Polycomb (Pc) and Polycomb group genes (PcG) regulate cardiac patterning by repressing trithorax (trx) mediated Hox expression within Drosophila melanogaster*, presented at Indiana Academy of Science Conference, 2025.

**Rayhan, M.S.A.**, Islam, S., Farmer, A.J., Ahmad, S.M. & Schwab, K.R., 2024. *Polycomb group genes (PcG) regulate cardiac patterning by repressing trithorax (trx) mediated abdominal-A expression*, presented at Midwest Drosophila Conference, 2024.

**Rayhan, M.S.A.**, Islam, S., Farmer, A.J., Ahmad, S.M. & Schwab, K.R., 2024. *Polycomb group genes (PcG) regulate cardiac patterning by repressing trithorax (trx) mediated abdominal-A expression*, presented at Indiana Academy of Science Conference, 2024.

**Rayhan, M.S.A.**, Islam, S., Farmer, A.J., Ahmad, S.M. & Schwab, K.R., 2023. *Polycomb group genes are required for hox expression and cardiac patterning of the Drosophila heart tube*, presented at Midwest Drosophila Conference, 2023.

Islam, S., **Rayhan, M.S.A.**, Farmer, A.J., Ahmad, S.M. & Schwab, K.R., 2023. *Polycomb patterns the anterior embryonic dorsal vessel by repressing abdominal-A expression*, presented at Indiana Academy of Science Conference, 2023.

Islam, S., **Rayhan, M.S.A.**, Farmer, A.J., Ahmad, S.M. & Schwab, K.R., 2022. *Polycomb patterns the anterior embryonic dorsal vessel by repressing abdominal-A expression*, presented at Midwest Drosophila Conference, 2022.

**Rayhan, MSA.**, Bose PK, Sarower MG, Ali MY., 2019. Identification and comparative analysis of Heat Shock Protein genes *Hsp70* and *Hsp90* from gill transcriptomes of three Australian crayfish, presented at Biennial Fisheries Conference, 2019, Bangladesh.

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#### REVIEWER ACTIVITIES

- Reviewed a manuscript for the journal *Heliyon* from the cell press publishers. 2024.
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#### RESEARCH FUNDING (Grants)

- Indiana Academy of Science Senior Research Grant. 2025. Project Title: *trithorax (trx)* group and *Polycomb (Pc)* group regulation of seven up (svp) cardiac progenitor cell division and patterning. Amount awarded: \$4986.52. PI: **Md. Sayeed Abu Rayhan**, Sumaiya Islam, Sponsor: Dr. Kristopher Schwab.
  - Indiana Academy of Science Senior Research Grant. 2023. Project Title: The role of *PcG* regulation of cardiac Hox expression and heart patterning within *Drosophila melanogaster*. Amount awarded: \$3000. PI: **Md. Sayeed Abu Rayhan**, Sponsor: Dr. Kristopher Schwab.
  - Graduate Student travel grant. 2023. College of Graduate and Professional Studies. Polycomb gene patterns the anterior embryonic dorsal vessel by repressing *abdominal-A* expression. \$200
  - Graduate Student travel grant. 2022. College of Graduate and Professional Studies. *Polycomb* patterns the anterior embryonic dorsal vessel by repressing *abdominal-A* expression. \$250
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#### AWARDS AND RECOGNITION

- Rich and Robin Porter Cancer Research Fellowship, Indiana State University. 2025-26.
  - Rich and Robin Porter Cancer Research Fellowship, Indiana State University. 2024-25.
  - Rich and Robin Porter Cancer Research Fellowship, Indiana State University. 2023-24.
  - National Science and Technology Fellowship of Peoples Republic of Bangladesh for advanced research, 2020.
  - Undergraduate Student Merit Award and scholarship, 2017-18.
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#### MEMBERSHIP AND POSITIONS

- Genetics Society of America (GSA), 2024-2025
  - American Heart Association. Member, 2023-2024.
  - Indiana Academy of Science. Member, 2023-24.
  - Rotaract Club, Khulna, Bangladesh, Member, 2014-2020.
  - Badhon Blood donating Organisation. Member, 2014-2020.
  - Satkhira Student Association, Khulna University. General Secretary, 2017-18.
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#### ACADEMIC REFERENCES

##### **Dr. Kristopher R. Schwab (Advisor)**

Associate Professor, Department of Biology, Indiana State University, Terre Haute, Indiana 47809  
Science Building, 287L

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Email: Kris.Schwab@indstate.edu

##### **Dr. Shaad M. Ahmad**

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Science Building, 287H

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