

# ISHA KALRA

Marine and Environmental Biology  
University of Southern California  
Los Angeles, California

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## EDUCATION

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**Miami University, Ohio**

**2014 – 2021**

**Ph.D. Microbiology**

*Thesis: Role of cyclic electron flow (CEF) and Photosystem I (PSI) supercomplex formation during acclimation to long-term salinity stress in green algae: a comparative study*

**BITS Pilani, KK Birla Goa campus, India**

**2008 – 2013**

**B.E. (Hons.) Electronics and Instrumentation + MSc. (Hons.) Biological Science**

*Thesis: Isolation and characterization of hydrolytic enzyme producing extremely halophilic archaeon Halogeometricum sp. E3 from solar salterns of Tamil Nadu, India*

## RESEARCH EXPERIENCE

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**Postdoctoral Researcher, University of Southern California**

**August 2021 - Present**

Marine and Environmental Biology

Advisor: Dr. David A. Caron

**Graduate Student, Miami University, Ohio**

**2014 - 2021**

Department of Microbiology

Advisor: Dr. Rachael Morgan-Kiss

- Established that excess ATP from PSI-cyclic electron flow (CEF) results in upregulation of carbon metabolism pathways in Antarctic alga *Chlamydomonas* sp. UWO241. (Published in *Plant Physiology*)
- Identified the microbial community response to environmental perturbation in Lake Bonney, MCM dry valleys, Antarctica. (Manuscript *in submission*)
- Identified and characterized novel protein supercomplexes important for CEF under long-term stress in different *Chlamydomonas* species. (Manuscript *in prep*)
- Characterized the metabolism of a laboratory evolved fast-growing *Chlamydomonas reinhardtii* strain with a high CET phenotype. (Manuscript *in prep*)

**Master's Student, BITS Pilani KK Birla Goa campus, India**

**2012 - 2013**

Department of Biological Sciences

Advisor: Dr. Judith Braganca

- Characterized and sequenced a novel halophilic archaeon. Screened for enzymatic activities in six different halophilic bacteria/archaea isolates. (Published in *Environmental Sustainability*)

## PUBLICATIONS

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1. Sherwell, S.\*, Kalra, I.\*, Li W., Priscu, J.C., Morgan-Kiss, R. Impact of environmental disturbance on bacterial and eukaryal community diversity and function in Lake Bonney, McMurdo Dry Valley, Antarctica. *In submission*. \***Equal authorship**

2. Stahl-Rommel, S., **Kalra, I.**, D'Silva, S., Hahn, M., Cvetkovska, M. and Morgan-Kiss, R. (2021). High cyclic electron flow (CEF) and ascorbate pathway activity provide constitutive photoprotection in a salt-tolerant, cold-adapted *Chlamydomonas* sp. UWO241. *Journal of Photosynthesis research* (accepted)
3. Hüner, N., Smith, D., Cvetkovska, M., Zhang, X., Ivanov, A., Szyszka-Mroz, B., **Kalra, I.**, Morgan-Kiss, R. (2021). Photosynthetic Adaptation to Polar Life: Photopsychrophily and Psychrotolerance as Emergent Phenomena. Humboldt Review. *Journal of Plant Physiology* (Provisionally accepted)
4. **Kalra, I.**, Wang, X., Cvetkovska, M., Jeong, J., McHargue, W., Zhang, R., Hüner, N., Yuan, J. & Morgan-Kiss, R. (2020). *Chlamydomonas* sp. UWO241 exhibits high cyclic electron flow and rewired metabolism under high salinity. *Plant Physiology*, 183(2) 588-601. (\*Highlighted in *Plant Physiology News and Views*)
5. Shinde, S., Zhang, X., Singapuri, S. P., **Kalra, I.**, Liu, X., Morgan-Kiss, R. M., & Wang, X. (2020). Glycogen Metabolism Supports Photosynthesis Start through the Oxidative Pentose Phosphate Pathway in Cyanobacteria. *Plant Physiology*, 182(1), 507-517.
6. Wu, C., Jiang, H., **Kalra, I.**, Wang, X., Cano, M., Maness, P., Yu, J. & Xiong, W. (2020). A generalized computational framework to streamline thermodynamics and kinetics analysis of metabolic pathways. *Metabolic Engineering*, 57, 140-150.
7. Das, D., **Kalra, I.**, Mani, K., Salgaonkar, B. B., & Braganca, J. M. (2019). Characterization of extremely halophilic archaeal isolates from Indian salt pans and their screening for production of hydrolytic enzymes. *Environmental Sustainability*, 2(3), 227-239.
8. Cook, G., Teufel, A., **Kalra, I.**, Li, W., Wang, X., Priscu, J., & Morgan-Kiss, R. (2019). The Antarctic psychrophiles *Chlamydomonas* spp. UWO241 and ICE-MDV exhibit differential restructuring of photosystem I in response to iron. *Photosynthesis Research*, 141(2), 209-228.

## MANUSCRIPTS IN PREP

1. **Kalra, I.**, Wang, X., Zhang, R., Morgan-Kiss R.M. Lake stratification affects the acclimation strategies of two Antarctic psychrophiles *Chlamydomonas* spp. UWO241 and ICE-MDV
2. **Kalra, I.**, Jaques, I., Wang, X., Morgan-Kiss R.M. Characterization of a laboratory evolved fast-growing *Chlamydomonas reinhardtii* with a constitutively high cyclic electron transport phenotype.

## RESEARCH TECHNIQUES

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**Wet Lab:** RNA and DNA extraction, library preparation for NGS, qPCR, protein extraction and preparation for shotgun proteomics, SDS PAGE and western blot, density gradient centrifugation, flowcytometry, spectroscopy, fluorometry, batch cultivation of non-model and model micro-organisms, confocal microscopy, HPLC, LC/MS/MS

**Knowledge of programming languages and bioinformatic tools** including: Unix shell scripting, R, QIIME, CLC Workbench 10, PatternLab for shotgun proteomics analysis

## FIELD WORK

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### McMurdo (Antarctica) LTER Field Season

**Dec 2018- Feb 2019**

Conducted six weeks research at Lake Bonney and Lake Fryxell in McMurdo Dry Valleys. Work consisted of drilling ice holes, sampling water from moat and ice-covered lake, DNA filtration, PAR and temperature profiling, chlorophyll profiling with fluoroprobe, nutrient analysis, EEMS analysis, chlorophyll filtration and fluorometry.

## AWARDS

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- **Dissertation Fellowship**, Miami University, \$10,377 2020
- **Orton K Stark award for research excellence**, Miami University, \$750 2018
- **Travel Award**, American Society of Plant Biology, \$1500 2018
- **Travel Award**, Don Cox, Miami University, \$1000/\$500 2018, 2017, 2016
- **Dr. Bhattacharjee Award for outstanding research prospectus**, Miami University, \$200 2017
- **Susan Rockwood Award for research and teaching excellence**, Miami University, \$750 2017
- **Best student poster award**, ASPB Midwest Photosynthesis conference, \$200 2016

## MENTORING EXPERIENCE

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1. Shasten Sherwell (REU student, Summer 2015) Currently working on HABs as an EPA fellow in Boston.
2. Jessica Clark (2016-2017) Pursuing Master's in Public Health at Cleveland Clinic.
3. Katrina DeWills (REU student, Summer 2017)
4. Isaiah Jacques (2018-2020) First year medical student at Ohio state university.
5. Susanna D'Silva (2019-2020) Currently in fourth year at Miami University pursuing microbiology major.

## TEACHING EXPERIENCE

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1. **Guest Lecturer, Microbial Ecology course (MBI 475)**  
Spring 2020  
Taught introduction lecture on evolution of photosynthesis on Earth.
2. **Lab Instructor, Microbial Ecology (MBI 475)**  
Taught the laboratory course in Spring 2015, Spring 2017, Spring 2018  
Lab conducts amplicon sequencing analysis of environmental samples to answer various ecological questions.
3. **Lab Instructor, Microbial Physiology (MBI 425)**  
Taught the laboratory course in Fall 2016, Fall 2019
4. **Lab Instructor, Introduction to Microbiology (MBI 201)**  
Taught the introductory microbiology laboratory course in Fall 2015, Spring 2016
5. **Lab Instructor, Introduction to Biology (BIO 115)**  
Taught the introductory biology laboratory course Fall 2014

## SELECTED CONFERENCE PRESENTATIONS

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1. **Kalra, I., Wang, X., Cvetkovska, M., Jeong, J., McHargue, W., Zhang, R., ... & Morgan-Kiss, R., 2019. "Chlamydomonas sp. UWO241 exhibits constitutively high cyclic electron flow and rewired metabolism under high salinity." Oral presentation, Ohio Branch ASM meeting, Athens, Ohio.**
2. **Kalra, I., Wang, X., Cvetkovska, M., Jeong, J., McHargue, W., Zhang, R., ... & Morgan-Kiss, R., 2018. "Chlamydomonas sp. UWO241 exhibits constitutively high cyclic electron flow and rewired metabolism under high salinity." Poster Presentation, ISPR Photosynthesis conference, Montreal, Canada.**
3. **Kalra, I., Xin Wang and Morgan-Kiss R., 2018 "Formation of PSI-Supercomplexes promotes sustained cyclic electron flow during long-term stress acclimation" Poster Presentation, ASPB Plant Biology, Montreal, Canada**
4. **Kalra, I. and Morgan-Kiss R., 2017 "Effect of long-term salinity in Chlamydomonas species", Poster presentation, Gordon research conference- Photosynthesis, Maine, USA.**
5. **Kalra, I. and Morgan-Kiss R., 2016 "Long-term salinity stress leads to attenuation of state transition response in Chlamydomonas species", Poster presentation, Midwest-Photosynthesis meeting, Indiana, USA.**
6. **Kalra, I., Das, D. & Braganca, J. 2013 "Isolation and characterization of hydrolytic enzyme producing extremely halophilic archaeon Halogeometricum sp. E3 isolated from solar salterns of Tamil Nadu, India." Poster presented at 10<sup>th</sup> international conference Halophiles 2013, Connecticut, USA**

## REFERENCES

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- 1. Dr. Rachael Morgan-Kiss (PI)**  
Professor, Microbiology Department, Miami University  
Email: [morganr2@miamioh.edu](mailto:morganr2@miamioh.edu)
- 2. Dr. Luis Actis**  
Department Chair and Professor, Microbiology Department, Miami University  
Email: [actisla@miamioh.edu](mailto:actisla@miamioh.edu)
- 3. Dr. Xin Wang**  
Assistant Professor, Microbiology Department, Miami University  
Email: [xwang@miamioh.edu](mailto:xwang@miamioh.edu)