Cleverson de Sousa Lima

PhD Candidate
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Education

Doctorate in Biology (2021 – present)
University of Kentucky. Lexington, KY. United States
Dissertation title: *Adaptations to extreme environments in Antarctic midges*
Dissertation Committee: Catherine Linnen (Chair), Nicholas Teets (Co-advisor), Jeramiah Smith (Co-advisor), Jake Ferguson

Bachelor of Science in Biology (2019)
Universidade Cidade de São Paulo. São Paulo, SP. Brazil.
Thesis title: *Stress physiology of leaf-cutting ants*
Thesis Committee: Cintia Vieira (Chair), Agustin Camacho (Advisor), William Matiazzi, Francisco Assis

Publications

Devlin, J. J., **Lima, C**., Kawarasaki, Y., Gantz, J. D., Pavinato, V. A., Scaramelli, M., ... & Teets, N. M. (2025). Prevalence and consequences of microplastic ingestion in the world's southernmost insect, Belgica antarctica. *Science of the Total Environment*, *1004*, 180800. https://doi.org/10.1016/j.scitotenv.2025.180800

Lima, C., Helene, A. F., & Camacho, A. (2022). Leaf-cutting ants' critical and voluntary thermal limits show complex responses to size, heating rates, hydration level, and humidity. *J Comp Physiol B* **192,** 235–245. https://doi.org/10.1007/s00360-021-01413-6

Works in Progress

Lima, C., Ferguson, J., Linnen, C., Michel, A., Convey, P., Hayward, S., Gantz, J. D., Kawarasaki, Y., Smith, J., Teets, N.
The effects of microhabitat temperature on phenotypic and genetic variation in *Belgica antarctica* populations. *In prep.*

Lima, C., Colinet, H., E., Michel, A., Convey, P., Hayward, S., Gantz, J. D., Kawarasaki, Y., Smith, J., Teets, N.
Freeze tolerance is enhanced through distinct mechanisms via cross-tolerance activated by mild levels of thermal, ionic and osmotic stress. *In prep.*

Gantz, J. D., Philip, B., Kawarasaki, Y., Potts, L., Spacht, D., Benoit, J., **Lima, C.**, Denlinger, D., Lee, R., Teets, N. Brief exposure to environmental stress enhances stress tolerance in the Antarctic midge, Belgica antarctica. *In review: Journal of Experimental Biology*

Lima, C., Aquilino, M., Kawarasaki, Y., Gantz, J. D., Pavanato, V., Devlin, J., Michel, A., Convey, P., Hayward, S., Teets, N. Physiological responses to multiple stressors in Antarctic terrestrial

polyextremophile insects, the endemic midge *Belgica antarctica* and the invasive midge *Eretmoptera murphyi*. *In review: Journal of Experimental Biology*

Lima, C., Lecheta, M., Cecconi, S. Smith, J., Ferguson, J., Hotaling, S., Gantz, J.D., Michel, A., Convey, P., Hayward, S., Kawarasaki, Y., Teets, N. Mechanisms underlying recovery from freezing in the polyextremophile chironomid *Belgica antarctica*. *In review: Proceedings B*

Ongoing Research Projects

Conserved Mechanisms Underlying Environmental Adaptations in Chironomidae Species

This project will investigate mechanisms associated to a variety of adaptations to extreme environmental conditions in several representants of the Dipteran family Chironomidae and to which degree conserved mechanisms contribute to unique adaptations. Examples include freeze-tolerance in the endemic and invasive polar midges *Belgica antarctica* and *Eretmoptera murphyi*, anhydrobiosis in the sleeping midge *Polypedilum vanderplanki* and the toleration to salinity in the parthenogenic *Telmatogeton magellanicus*.

Role: Lead Scientist

In development

Adaptations to extreme environmental conditions in Antarctic midges (01/2024 – present)

This project is investigating mechanisms associated with cross-tolerance and other plastic responses to stress in the polyextremophile *Belgica antarctica*.

Role: Lead Scientist

Funded by: Department of Entomology, College of Agriculture, Food and Environment, University of Kentucky

Research Experience

Comparative physiology of Antarctic and subantarctic midges (2021-2023)

Department of Entomology, College of Agriculture, Food and Environment, University of Kentucky

Investigating the relative importance of the genes responsible for regulating recovery from freezing in Antarctic midges; Investigating how midges cope with different stressors posed by Antarctica's extreme climate.

Role: Collaborator

Funded by National Science Foundation – NSF (grant number: 1850988 - https://www.nsf.gov/awardsearch/showAward?AWD_ID=1850988*).*

Regulation of Thermal Tolerance in Leaf-cutting Ants (2018-2019)

Project description: Physiological and environmental factors (body size, dehydration, time of exposure) influencing leaf-cutting ants' tolerance to high temperatures were investigated to understand how these animals integrate physiological and behavioral cues to cope with challenges posed by Climate Change.

Role: Lead Scientist

Developed at: Departmento de Fisiologia, Instituto de Biociências, Universidade de São Paulo Instituto de Biociências, Universidade de São Paulo. São Paulo, SP. Brazil. Funded by: *Fundação de Amparo à Pesquisa do Estado de São Paulo - FAPESP (Grant number: 2018/15664-5 -* https://bv.fapesp.br/en/bolsas/181979/regulation-of-thermal-tolerance-in-leafcutter-ants/*).*

A Method to Evaluate Leaf-Cutting Ants' Thermal Tolerance (08/2017 – 08/2019)
Project description: Designing and assembling a device and a method to measure small arthropods' tolerance to high temperatures.
Role: Collaborator
Developed at: Department of Physiology, Institute of Biosciences, University of São Paulo.

Field Experience

Antarctica (Nov/2023-April/2024)
Project: Adaptations to extreme environmental conditions in Antarctic midges
Role: Lead Scientist
Description: Coordinated field collections and field experiments on islands of the vicinity of Palmer Station, as well as laboratory experiments at Palmer Station.

Terra del Fuego (April 2023)
Role: Collaborator
Project: Comparative physiology of Antarctic and subantarctic midges
Description: Participated in field collections at the coast of Cabo de Hornos and coordinated laboratory experiments at Centro Universitario Universidad de Magallanes

Antarctica (Feb-Apr/2023)
Role: Collaborator
Project: Comparative physiology of Antarctic and sub-Antarctic midges
Description: Participated in field collections at 30 islands across the Antarctic Peninsula

Conference Presentations

Recovery from freezing in the Antarctic midge, *Belgica antarctica (invited speaker, bioenergetics symposium)*
XXVII International Congress of Entomology
Kyoto, Japan. 2024

The importance of cross-tolerance in a polyextremophile: the Antarctic midge, *Belgica antarctica (award winner, low temperature biology symposium)*
XXVII International Congress of Entomology
Kyoto, Japan. 2024

Long-term recovery from freezing in the Antarctic midge *Belgica antarctica*
XIII Scar Biology Symposium
Christchurch, New Zealand. 2023

Changes in energy reserves and genetic activity levels during recovery from freezing in the Antarctic midge *Belgica antarctica*
9th International Symposium on the Environmental Physiology of Ectotherms and Plants
Rennes, France. 2022.

Thermal tolerance in leaf-cutting ants: a story about the importance of methodology

Society for Integrative and Comparative Biology Annual Meeting
Phoenix, AZ. United States. 2022

Contributed Presentations

Integrating multiple abiotic stressors through cross-tolerance in an Antarctic insect
Lima, C., Kawarasaki, Y., Gantz, J.D., Colinet H., Michel, A., Convey, P., Hayward, S., Teets, N.*
10th International Symposium on the Environmental Physiology of Ectotherms and plants
Vancouver. Canada. 2025

Behavioral thermoregulation responses to dehydration do not differ between invertebrates and vertebrates
Camacho, A.*, **Lima, C.**, Molina-Guevara, C. Nunes, T., Marques-Souza, S., Priscilla Reis-Custódio, M., Frazão, A., Ribeiro F.
8th International Symposium on the Environmental Physiology of Ectotherms and plants
Buenos Aires. Argentina. 2019
**Presenter*

Conference Posters

How leaf cutting ants cope with climate changes? Behavioral and physiological evidence
27° Simpósio Internacional de Iniciação Científica e Tecnológica da USP
São Paulo, Brazil. 2019

Factors Affecting Heat Tolerance in Leaf Cutting Ants
8th International Symposium on the Environmental Physiology of Ectotherms and Plants
Buenos Aires, Argentina. 2019

A method to evaluate how small arthropods behaviorally adjust their physiological constraints to temperature rises
Organism-Environment Interactions: Timing, Plasticity and Metabolic Adjustments
São Paulo, Brazil. 2018

Teaching Experience

BIO 350 Animal Physiology (40 students)
Fall 2025
Supervisors: Dr. Julie Pendergast, Dr. Melody Danley
Department of Biology, University of Kentucky

BIO 350 Animal Physiology (30 students)
Spring 2025
Supervisors: Dr. Robin Cooper, Dr. Melody Danley
Department of Biology, University of Kentucky

BIO 350 Animal Physiology (20 students)
Fall 2024
Supervisors: Dr. Julie Pendergast, Dr. Melody Danley.
Department of Biology, University of Kentucky

ENT 300 General Entomology (30 students)
Spring 2023
Supervisor: Dr. Jen White.
Department of Entomology, University of Kentucky

Advising Experience

Differences in thermal tolerance between the invasive Drosophilids *Zaprionus indianus* and *Drosophila suzukii*
Student: Sara Ihrig
Description: Project developed as part of student's MS thesis.
Developed at: Department of Entomology, Martin-Gatton College of Agriculture, Food and Environment, University of Kentucky. 2025

Energetics of recovery from freezing in the Antarctic Midge, *Belgica antarctica*
Student: Sam Cecconi
Description: Project developed as a requirement for ABT 395 Independent Study in Biotechnology.
Project developed at: Department of Entomology, Martin-Gatton College of Agriculture, Food and Environment, University of Kentucky. 2023

Service

Graduate Student Affairs representative (2025-2026), Biology Graduate Student Association (BGSA). University of Kentucky.

Reviewer for Physiological Entomology (ISSN:1365-3032)

Outreach and Volunteering

Volunteer at 2024 BioBonanza, an open house annual festival that hosts games, biological specimen displays and demonstrations of experiments from several STEM disciplines, promoting education for k-12 students (and parents), as well as fostering the relationship between UK scientists and the Kentucky community.
Department of Biology, University of Kentucky. Lexington, KY. United States.

Science in Antarctica (Outreach talk: 50 attendees). 2023.
Department of Entomology, University of Kentucky. Lexington, KY. United States.

Volunteer at the 2023 High School Genetics Bootcamp, a week-long camp for local students (30), in which hands-on experiments were taught and conducted, including PCR, molecular barcoding, heredity, and assessing quantitative traits in Drosophila melanogaster.
Department of Entomology, University of Kentucky. Lexington, KY. United States.

From undergraduate to graduate school: what is my place in science? (Outreach talk: 90 attendees). 2019.
UNICID Biology Thematic Week. Universidade Cidade de São Paulo. São Paulo, SP. Brazil.

Society Memberships

Kentucky Academy of Science, since 2025

Entomological Society of America, since 2025

Society for Integrative and Comparative Biology, 2022-2023

Grants

IQC Assistantship
Instituto Questão de Ciência
R$ 10,000.00, one-time travel grant)

FAPESP Undergraduate Research Grant.
Fundação de Amparo à Pesquisa do Estado de São Paulo (#2018/15664-5)
R$ 9,200.00 over one year

Awards

US-SCAR ECS Travel Award
Conference: XIII Scar Biology Symposium
Awarded by: University of San Francisco. 2023
Budget: US$ 2,500.00, *nationally competitive*

US-SCAR ECS Travel Award
Conference: 9th International Symposium on the Environmental Physiology of Ectotherms and Plants
Awarded by: University of San Francisco. 2022
Budget: US$ 2,500.00, *nationally competitive*

Graduate Student Travel Award
Conference: Society for Integrative and Comparative Biology Annual Meeting
Awarded by: University of Kentucky and National Science Foundation. 2022
Budget: US$ 2,000.00

Honors

Presentation Award for Young Scientists by International Congress of Entomology Council
Conference: XXVII International Congress of Entomology. 2024

National Science Foundation Antarctic Service Medal by US Antarctic Program
Description: Medal awarded to individuals with at least six weeks of field research experience at a US Antarctic base. 2023

Honorable Mention for best student poster presentations by Universidade de Sao Paulo

Conference: 27° Simpósio Internacional de Iniciação Científica e Tecnológica da USP. 2019

Student and Young Scientist Award by Sable Systems
Conference: 8th International Symposium on the Environmental Physiology of Ectotherms and Plants. 2019

Trainings and Certifications

Research in Extreme Environments (Land)
- Research in Antarctica
- Laboratory safety on Research Station
- Field safety and survival
- Animal Research Compliance
- Biological Safety
- Chemical Hygiene
- Chemical Fume Hood
- Fire Extinguisher Use

U.S. Antarctic Program, Antarctica. 2024.

Research in Extreme Environments (Sea)
- Research in Antarctica
- Laboratory safety on Research Vessels
- Field safety and survival
- Animal Research Compliance
- Biological Safety
- Chemical Hygiene
- Chemical Fume Hood
- Fire Extinguisher Use

U.S. Antarctic Program, Antarctica. 2023.

Responsible Conduct of Research and Scholarly Activity
- Welfare of Laboratory Animals
- Research Misconduct Conflicts of Interest
- Data Management Practices
- Mentor and Trainee Responsibilities

University of Kentucky. Lexington, KY. United States. 2022, 2023, 2024

Laboratory Safety
- Biological Safety
- Chemical Hygiene
- Autoclave
- Chemical Fume Hood
- Fire Extinguisher Use

University of Kentucky. Lexington, KY. United States. 2022, 2023, 2024

References

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Associate Professor. Department of Entomology, University of Kentucky
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Associate Professor in Biology. Gustavus Adolphus College
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Palmer Station Laboratory Manager, United States Antarctic Program
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