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https://www.linkedin.com/in/giulia-magri-ribeiro-aa522390/ | Brazilian/Portuguese, 31 years

September 23, 2025

Job Application for Natural Science Chair at Deep Springs College

Dear Selection Committee

I am thrilled to submit my Natural Science Chair at Deep Springs College, beginning August 2026. I hold a Ph.D. in Biology/Zoology from São Paulo University in collaboration with the Madrid's Royal botanical garden. Although I don't have much experience leading a course, I have still very rich teaching, research, and undergraduate student advising experience at institutions committed to undergraduate education. I am also particularly interested by the College's mission that integrates academics, self-governance and immersed labor in good education.

My previous teaching experience is in teaching assistance for biodiversity, genetics, molecular biology, cell biology, classes. My pedagogy involves active, inquiry-based learning, field studies and interdisciplinary approaches. I plan my lectures and lab courses materials specifically to assess students' scientific communication, problem-solving, and critical thinking skills. For example, I may guide students through research projects involving microbial diversity in desert soils, ecological adaptation of native flora and fauna, or bioinformatic approaches to environmental DNA analysis. I developed materials for São Paulo University courses that not only built learning, but also collaborative problem-solving ability among the students. It takes both scientific literacy and resilience, cooperation, and problem-solving capability valued by Deep Springs.

As also central to my academic work is mentoring undergraduate students in research. My own research in population genetics, cell biology, bioinformatics, is thus similarly geared towards taking on students of all stages. My advised students have always been mentored through independent research to conference presentations, co-authored publications, and Thesis. I believe that I would create a research team at Deep Springs both advancing my intellectual agenda and providing students direct experience for the development of technical skills, experiment design, and involvement in publishable research.

I am also dedicated to fostering diversity, equity, and inclusion in the undergraduate learning. In my supervision of research students, and instruction, I designed practices that break down participation barriers and include students from historically disenfranchised groups. Some of these include facilitating the bioinformatic learning process through the development of booklets and studying guides, and establishing a mentoring culture that values the various experiences that students bring to the classroom and lab.

Lastly, I feel that service to better quality and environment where we are situated is an important aspect of faculty life. Throughout my career, I was always involved in the activities of the department, committees, and outreach programs at São Paulo University. On this basis, I would be very pleased to share these experiences and construct these activities with the Deep Springs community in the same manner.

Finally, the chance to join Deep Springs and support the goals of the College excites me. I've sent my resume, teaching and research statement, and the contact information for three qualified references. I appreciate the consideration of my application. I look forward for a chance to talk about how my experience in research, teaching, and service can contribute to your institution.

ORCID: `https://orcid.org/0000-0003-3366-3735`

References:

Prof. Dr. Daniel José Galafasse Lahr , University of São Paulo, email: dlahr@ib.usp.br

Prof. Dra. Laura A. Katz , Smith College, email: lkatz@smith.edu

Dr. Enrique Lara Pandi , Real Jardín Botánico de Madrid, email: enrique.lara@rjb.csic.es

Sincerely,

Giulia M. Ribeiro

Introduction: Describe my research

My research program investigates diversity, physiology, evolution of microbial eukaryotes - organisms that subvert common knowledge and highlight the deep complexity of life - in a cross disciplinary manner that bridges bioinformatics, molecular biology, environmental genomics, and evolutionary theory, to answer questions of fundamental importance concerning adaptation, speciation, and genomic innovation in microorganisms.

Microbial Eukaryotic Resilience in a Changing World

While pursuing my graduate education at the University of São Paulo, Smith College, and the Royal Botanical Garden, I studied the effects of environmental change on taxonomic and functional diversity within testate amoebae. These organisms are significant taxa within freshwater and peatland communities, and exhibit a remarkable tolerance to pollutants, among other stressors, (e.g., eutrophication and salinity). My project aimed to answer the basic question of how these organisms respond physiologically and transcriptionally to such environmental conditions.

My research has advanced understanding in several key areas :

- **Environmental and Physiological Adaptation:** Through experimental and bioinformatic approaches, I have investigated how testate amoebae, bacteria and other protists respond to stressors such as colonization of the host, arsenic, hypoxia, and salinity, revealing both mechanisms of resistance and evolutionary trends.
- **Speciation, Diversity, and Metabolic Innovation:** I have characterized the distribution and functional variety of microbial eukaryotes using SNPs, transcriptomic profiling, and phylogenetic modeling, uncovering cryptic diversity and lineage-specific adaptations.
- **Collaborative Innovation and Method Development:** I have contributed to pipelines for comparative phylogenomics (e.g., EukPhylo), environmental DNA analysis, and functional annotation, facilitating a collaborative and open approach in the scientific community.

Genomic Innovations and Evolution of Resistance Mechanisms

A significant outcome of my work has been the identification of resistance gene families and their putative evolutionary origins. While lateral gene transfer (LGT) has traditionally been viewed as rare in eukaryotes, my analyses suggest that key metabolic innovations, including arsenic detoxification pathways, may indeed be acquired through such rare yet consequential events. As a future research direction, I will expand metabarcoding approaches to link ecological distribution patterns of Arcellinida with their molecular adaptations. By integrating metatranscriptomics, single-cell transcriptomics and genomics, I aim to uncover adaptive traits and novel resistance loci, shedding light on how genome plasticity and metabolic evolution shape microbial survival under stress (Figure 1).

Computational Approaches and Phylogenomic Integration

A growing component of my research involves the application of computational tools to analyze large-scale transcriptomic datasets and infer evolutionary relationships. I plan to develop student friendly modular computational pipelines as in the manner of Eukphylo (https://github.com/Katzlab/EukPhylo/wiki) - pipeline that I currently work with - that is able to perform differential expression analysis, sequence homology inference, predict gene function and evolutionary origin. These tools will be crucial for managing

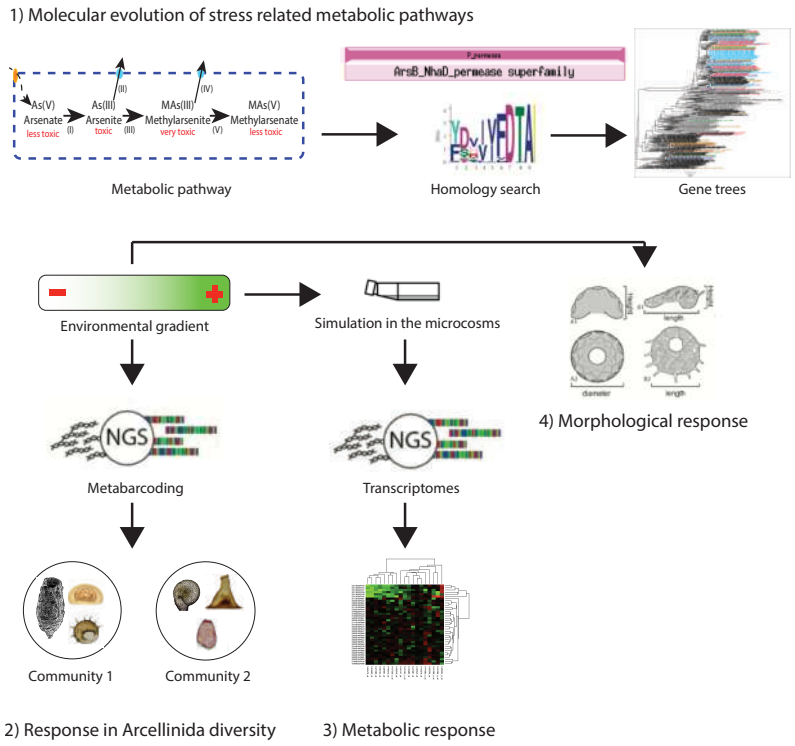

Figure 1: *Schematic representation of the methodological workflow.* The approach investigates how organisms adapt to environmental gradients at four complementary levels: (i) Gene family evolution of resistance genes, (ii) community composition through metabarcoding using next-generation sequencing (NGS) (left), and (iii) cellular function through transcriptome analyses via NGS (center), (iv) morphological traits of organisms (right)

the increasing volume of omics data, ensuring reproducibility, and facilitating data sharing within the scientific community and student training.

Training, Interdisciplinarity, and Inclusion

My research is essentially interdisciplinary, merging ecological field sampling with high-throughput molecular biology and computational biology. I am also excited about creating more opportunities for early career scientists and students to engage in inclusive research environments. I also enjoy increasing opportunities for early-career scientists and students to experience inclusive research environments. Mentoring undergraduate researchers, when I observe and assist them with their lab practices and analytical work, has exemplified to me the flexibility, inclusivity, and curiosity-driven style and skill set I bring to my teaching and mentoring. I don't envision a ceiling or end to my lab and field program to broaden participation in science, to develop multiple pathways and entry points into transcriptomics, environmental microbiology, and evolutionary analysis. My research program focuses on building a collaborative network across cognitive and traditional areas of study to cultivate an intentional and vibrant lab culture that furthers the development of independent scientific identities in students.

Conclusion

In conclusion, my research aims to uncover the molecular and evolutionary basis of microbial eukaryotic resilience. etal eukaryotic resilience. By exploring how environmental stressors impact gene expression, developmental plasticity, and evolutionary novelty, I hope to help elucidate our understanding of life's ability to adjust to stressors. My integrative methods - including field-based research, laboratory experimentation, and computational-based methods - position my research at the intersection of environmental evolutionary

Teaching Statement – Giulia Magri Ribeiro

Throughout my academic path, from being the first generation university student in my family in Brazil to my current postdoctoral training abroad, I believe that I have personally experienced how strong education is when combined with supportive and engaging environment and mentorship. I always built my own path via participating in extension programs, looking for international collaborations, and try to extract the maximum of the opportunity of being in the best university in Brazil. Through my time in a public university in Brazil, I got aware of the privileges and barriers that students may encounter in accessing higher education. These have informed my teaching philosophy: building student curiosity, tenacity, while nurturing a fair and equitable learning community. My ultimate goal as a teacher is not only to teach biological content, but also to get students to learn the way they learn, to gain their confidence as scientists and critical thinkers.

Active Learning and Approaches

My teaching practice integrates active learning pedagogies and interdisciplinarity. As a beginner in my career, having experienced project-based activities such as Biology Station (an outreach activity that brought high school students to USP to learn biology) and CVZoo Zoology Summer Course, I realized the strength of hands-on and inquiry learning to foster deep engagement. Later, as a teaching assistant in classes such as Biological Diversity, Phylogeny, and Molecular Biology, I employed small group discussion strategies, project work, and problem-solving exercises. My students in my classes are asked to test hypotheses, play with real biological data, and apply theoretical principles to real-world scenarios like environmental stressors or microbial diversity. I do strongly believe that inquiry-based practices reinforce scientific concepts as well as introduce the open-ended nature of investigations and prepare the students for academic and professional challenges.

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Inclusivity, Diversity, and Student Support

Having started life in the state schools of Brazil, I am most attuned to the dilemmas a student encounters when educational opportunities confront economic constraints. I work to build classrooms where all students are enabled to thrive beyond background through scientific investigation or computer programming. My classroom practices aim to establish a supportive learning environment where questions are encouraged, mistakes are framed within learning, and varied perspectives enhance the group's knowledge. In

practice, I will apply cost-reducing methods to access science, including the use of open-source computer tools, lean molecular protocols that are useful in low-resource settings, and promoting collaborative group work.

Feedback and Assessment

Feedback is more effective offered as growth than as culmination. I utilize both instant feedback mechanisms (interactive exams, class problem-solving in groups, peer comments) and extended tests (studies, oral presentations, project work). I also encourage self-evaluation, this entails building accountability with the necessity for self-reflection and scientific communication.

Training, Interdisciplinarity, and Inclusion

One of my key goals as an educator is to help students build their scientific identity. I invite students to see themselves not only as students of biology but as scientists who do science. I have guided students through my different mentorship roles who have gotten research published, presented at conferences, and joined international collaborations. These experiences reinforce the fact that if responsibility is entrusted with students, trust is given, and they are granted the freedom to explore complexities, they are self-reliant scientists.

Courses I Am Prepared to Teach

I am prepared to teach in core/foundational undergraduate and graduate courses based on my expertise in molecular biology, physiology, microbiology, and evolutionary biology. Examples of courses I am prepared to teach:

- Basic curriculum courses: Cell Biology, Biological Diversity, Physiology, Molecular Biology, Microbiology, Ecology, and Evolution.
- Field- and Community-Based Courses: Desert Ecology and Adaptation (using the local flora, fauna, and soils as living laboratories); Water, Soils, and Life in Arid Environments (exploring ecological and molecular adaptations to limited resources); Bioinformatics and Evolutionary Genomics, Functional Transcriptomics; and Environmental Metagenomics.

In addition, I will continue to create new interdisciplinary workshops and courses to help students and general public specially with informatic approaches, such as:

- Biological Data Science for Biologists (R, Python, open-source pipelines, reproducible research practices).
- Introduction to Multi-omics Analysis (synthesis of transcriptomics, genomics, and metagenomics).
- Reproducible Research and Open Science Practices Workshops (GitHub, collaborative coding)

These courses will be taught using interactive notebooks, real biological data sets, and group projects in order to allow students to gain technical skill as well as conceptual understanding.

Commitment to Extension and Science Communication

Finally, teaching is not only a classroom experience for me. Through extension projects, textbooks, and team courses, I have seen the transforming power of science communication. At USP, I co-coordinated extension courses that introduced biology to high school students and to undergraduate peers, and afterwards, I took part in projects such as the book "Evolução é Fato" (Evolution is a fact), which aimed to democratize evolutionary biology knowledge. I plan to continue developing such projects that span academia to society, including low-resource lab protocols, teacher workshops, and public outreach projects on bacterial diversity and microbial ecology.