Teaching Statement

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I believe that teaching is one of the most important and fulfilling contributions that a scientist can make. Overall, my philosophy is to communicate and convey enthusiasm and excitement for the pursuit of scientific knowledge. This knowledge serves as the basis for critical thinking that is crucial to all aspects of living in society. My teaching experience has also contributed to other aspects of my career. For instance, by thinking about how to explain complex ideas to undergraduate students at the introductory level, I have also improved the way I explain these concepts in the papers I write, making the science I produce more accessible to society. In preparing lectures, I am motivated to read recent advances in areas that are different from that of my main research line, and this often gives me new ideas for research projects.

A principle I always follow when I am teaching is to explain to the students that the content that I present is the current understanding of that topic. This highlights that science is dynamic and makes new progress every day. I emphasize that many questions in ecology and evolution remain open to debate and encourage students to apply the scientific method when thinking about how to answer them. I also utilize recently published papers to show them that science moves incrementally. New data, theories, and tools are constantly being developed and applying these in a classroom setting is a more accurate representation of how science progresses than reading the history of science in a textbook. Another principle I have is to avoid unnecessary memorization of terms that can be easily forgotten and/or found in reference books. Even in topics where extensive terminology cannot be avoided, such as botany and plant sciences, I emphasize why those terms were created in the first place and the history behind the terminology.

Whenever possible I take the students for short (when large undergraduate classes) or long (when few graduate students) field expeditions. I think many concepts in ecology, evolution, and botany are better understood by observing nature directly in the field. An additional benefit of this is that experience with field observation and data collecting can often be crucial to the success of their future research projects. For example, when teaching a short course on “Ecology and Evolution of Pollination”, I took the students to observe plant-pollinator interaction in flowers with different phenotypes on the University of Brasilia campus. I showed them how to identify whether the interaction constituted legitimate pollination (i.e. with stigmatic contact) and how the behavior of particular pollinators changed depending on climate and time of the day. This helped them to understand plant reproduction, but also how environmental changes at local and global scales may lead to alterations on the dynamics of these interactions. At the University of Chicago, I anticipate to extensively use the greenhouse facilities for similar activities and to teach tropical biodiversity at both undergraduate and graduate levels.

Depending on the topic and size of the class, some courses can be more challenging to teach than others, and I have learned from experience that I must adapt courses to the size of the class and background of the students. For example, in a course I taught on "Biogeography and Diversification", the students had to present a small research project at the end of the course, using some tools (e.g. R scripts) that we had covered. The course had c. 50 student and because most of them had little previous experience with programming languages, it was challenging to assist all students that had problems simultaneously. In future similar courses, I will make sure to emphasize the importance of understanding and using these tools prior to assigning the final exercise.

In general, improving a student's ability to conduct research is an important component of their training. I have mentored undergraduate and graduate student working on different topics of plant evolution, biogeography, and systematics successfully. Many of these students have come from groups historically underrepresented in science in the US (e.g. Latin-American women), and I have successfully guided them through their first research projects and into their first publications in high impact factor journals (e.g. Sperotto et al., 2020; Colli-Silva et al., 2019, 2020; Melo et al., 2021). As an undergraduate and graduate advisor/mentor, I encourage students to approach problems from both empirical and theoretical standpoints, but I also emphasize that students should develop and pursue ideas of their own choosing. Providing students with this level of independence will reinforce the idea that students are not working *for* me, but rather *with* me. It will also give them confidence in their abilities to conduct research on their own, which is an important component of their success.

There are a variety of undergraduate courses I can teach, ranging from introductory biology to upper division botany, macroevolution, and biogeography. In addition to my required teaching assignment, I would work with other faculty members to co-organize a graduate level seminar course each semester. The goals for any graduate seminar course are to provide a platform where students learn the importance of developing constructive argumentative skills and critiquing the scientific literature using oral communication. During 2020, I ran a virtual, graduate-level discussion group related to topics in systematics, comparative phylogenetic methods, and macroevolution with two faculty members from different universities. The students were treated as colleagues, and we regularly challenge them to defend their understanding of complex subject matter. The other organizers and I openly disagree with readings from the literature, and, importantly, with each other. This emphasizes precisely what we do in the sciences, which is to think about ideas from multiple angles, disagree with interpretations of data, and make both personal and professional progress as a result. In addition, I could organize and develop an introductory course on programming that is intended solely for biologists. In my view, the ability to write a script to parse data or automate an analysis is a highly valuable skill, particularly as biology increasingly becomes a computationally driven field. For this reason, the material would focus on improving a students' ability to understand basic programming structure and syntax, to organize and manage data, and to efficiently run analyses. Such a course would appeal to students in a way that an introductory programming course in the computer sciences would not.

In sum, whether in small or large classes, my mentoring and teaching skills provide students with the support to link theory and practice necessary to think critically about nature in the context of ecology, evolution, and plant sciences. They will take what they learn in my classes not only to their professions, but also to their lives.

Papers cited in the text:

Colli-Silva M, Reginato M, Cabral A, Forzza RC, Pirani JR, Vasconcelos TNC. 2020. Evaluating shortfalls in biodiversity documentation for the Atlantic Forest, the most diverse and threatened Brazilian phytophysiognomic domain. *Taxon* - 10.1002/tax.12239

Colli-Silva M, Vasconcelos TNC, Pirani JR. 2019 Outstanding plant endemism levels strongly support the recognition of campo rupestre bioregions in mountaintops of eastern South America. *Journal of Biogeography* 46:1723–1733 - 10.1111/jbi.13585.

Melo LRF, Vasconcelos TNC, Reginato M, Caetano AP, Brito VLG 2021 Dependence on pollinators drives the evolution of stamen dimorphism in pollen flowers. *Perspectives in Plant Ecology, Evolution and Systematics*, 48:125589. 10.1016/j.ppees.2021.125589

Sperotto P, Acevedo-Rodríguez P, Vasconcelos TNC, Roque N. 2020. Towards a standardization of the terminology for the climbing habit in plants. *The Botanical Review* 86(3), 180-210. 10.1007/s12229-020-09218-y