November 4th, 2021

Genetics Assistant Professor Search Committee

Department of Biology

George Mason University MS 3E1

4400 University Drive

Dear Search Committee,

Please find enclosed my application for the Assistant Professor in Genetics position at George Mason University. I am currently the program manager and research scientist for the Consortium for Plant Invasion Genomics (CPING) at the University of Louisiana at Lafayette. I conducted my PhD research with Dr. Laura Galloway at the University of Virginia and served as an NIH-PERT postdoctoral fellow with Dr. Michael Barker at the University of Arizona.

Much of our understanding of evolution is predicated on the idea that most change occurs gradually through incremental accumulation of mutations over time. However, large-scale genomic changes can quickly have profound effects on the evolution, adaptation, and speciation of organisms. One such class of large-scale genomic changes is whole-genome duplication, which results in polyploidy, or presence of more than two genome copies per somatic cell. Polyploidy has wide-reaching evolutionary and ecological implications, including rapid reproductive isolation from related diploids, changes in mating system, and increased adaptability and phenotypic plasticity. Polyploidy is increasingly recognized as a major evolutionary force throughout eukaryotes, and comprises a substantial proportion of crop species and invasive plants.

My work uses experimental crosses, field and herbarium studies, genomics, and bioinformatics to infer the effects of polyploidy on eukaryotic evolution. I developed the *Campanula* *rotundifolia* polyploid complex as a model to challenge long-standing ideas of polyploid speciation in plants. I discovered that reproductive isolation, while nearly complete between diploids and tetraploids, is much lower between tetraploids and hexaploids. This difference in reproductive isolation, first identified via crossing experiments, is also evident in the degree of interploidy gene flow in natural populations. My work on polyploid mating system evolution has demonstrated that self-incompatibility is the product of the interplay of both ploidy level change and demographic history. My postdoctoral research focused on developing bioinformatic tools to identify ancient whole-genome duplications in eukaryotes that have since been masked by subsequent evolution. Currently, I am combining these research approaches to understand how *Salvinia molesta*, an aquatic, pentaploid, asexual, fern is such a successful invader of southeastern U.S. freshwater habitats. I have also recently initiated cleaning and restoration efforts in the ULL herbarium, which has lain dormant since the beginning of Covid and the departure of our previous curator.

As an educator with over nine years’ combined secondary and postsecondary experience, I have developed effective pedagogical approaches which have resulted in an award for teaching excellence as a graduate student and a competitive NIH teaching and research postdoctoral fellowship. I have guided students to become independent researchers and have helped students secure multiple graduate and professional school acceptances, industry jobs, and peer-reviewed publications to date, with more pending. My early teaching experiences included low-income rural high school students and freshmen at a historically Black university—these helped me understand the importance of lowering educational barriers and creating welcoming spaces for underrepresented and first-generation students. As a graduate student and postdoc, I sought out training opportunities to educate myself on the challenges underrepresented students face, and I continue to work to make my lab and my classroom supportive spaces for all students. This has included active recruitment of community college students as undergraduate researchers, making lessons more representative of Native American and Latinx students at Pima Community College in Tucson, AZ, and increasing representation for LGBTQ students.

As an evolutionary geneticist with field, herbarium, genomic, and bioinformatic interests, my research program will complement existing strengths in the department. My lab has varied research questions that lend themselves well to both undergraduate and graduate research and are well-suited for pursuing competitive funding. My ongoing collaborations with researchers in the CPING network will afford opportunities for my students to participate in bioinformatics and invasion biology research that complements their work and learning at George Mason University. I also plan to leverage resources currently available at GMU, including the Bradley Herbarium and the flow cytometric resources at the Center for Infectious Disease Research, to establish a respected, sustainable research program.

My work to date has added to our understanding of plant polyploid speciation and has shown that both intrinsic and extrinsic forces can alter reproduction in polyploids and encourage colonization and invasion. At George Mason University, my planned research program will build on these findings to better understand the role polyploidy has played in the evolution of plants and other eukaryotes. I have asked Dr. Laura Galloway (University of Virginia), Dr. Michael Barker (University of Arizona), and Dr. Nicholas Kooyers (University of Louisiana at Lafayette) to provide letters of reference upon request. Thank you very much for considering my application. I look forward to hearing from you.

Sincerely,

Brittany L. Sutherland

CPING Program Manager

University of Louisiana at Lafayette

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