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Selection Committee
Research Grants
International Association for Plant Taxonomy

Dear Selection Committee Members:

I am pleased to write in strong support of the application by Michelle (Shelly) Gaynor for a Research Grant from IAPT. Shelly is a second-year Ph.D. student in our lab, but I have known her since she was an undergraduate at the University of Central Florida. Shelly was the most outstanding undergraduate student I have seen in over 30 years of teaching and mentoring. Shelly has an extensive list of experiences and accomplishments despite her young age. She worked with us for only a month in the summer of 2017, and we quickly discovered that she is truly a phenom! We are now thrilled to have her in the lab for her graduate work! Below, I offer further comments on Shelly, her project, and her potential.

Shelly spent May of 2017 working in our lab as part of a 'mini-REU site program' offered by iDigBio, the US national center for digitization of biodiversity collections, supported by NSF. In a very short time (less than a week!), she developed the skills to conduct ecological niche modeling analyses of plant species using digitized herbarium records and environmental data from global databases. Of course, running the software is not necessarily difficult, but Shelly grasped all of the concepts behind the analysis in an amazingly rapid and thorough way. She read everything we offered her and more. She downloaded and manipulated large data sets, analyzed them in multiple software and statistical packages, and interpreted the results with insight and maturity. We have been fortunate to have worked with many talented students over the decades, but we were blown away by Shelly's accomplishments. She worked tirelessly and enthusiastically. At the end of the month, not only had she conducted some important research on niche divergence in the *Galax urceolata* autopolyploid complex (now the focus of her dissertation research and the subject of her proposal), she had also prepared an abstract for a poster to be presented at the annual Botany conference and a first draft of a manuscript on her work! This paper was published in the *American Journal of Botany*. And all of this from a 21-year-old!

Shelly's work with us in 2017 was brief because she had also been accepted into a formal REU site program at the University of Missouri, and we encouraged her to take that opportunity. Shelly has had an amazing set of research experiences. In 2016 she participated in an REU program at the University of Colorado. She presented the results of that work at Botany 2017 as an oral presentation (along with her poster from her time with us), for which she received the

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Botanical Society's award for the top undergraduate presentation at the conference! She was composed, clear, and articulate – along with having a good science message to share! All of her research experiences have given her tremendous confidence to tackle anything she faces, and we have every confidence in her ability.

Shelly is also able to communicate clearly, as evidenced by her Botany presentation and her writing skills. Also at the Botany 2017 conference, we hosted a workshop on the use of digitized herbarium data in research, with applications ranging from ecological niche modeling to biogeography. Shelly had enrolled as a participant, before she knew how extensive her skill set would be at that time, but we quickly recruited her to help as an instructor. She solved computational problems on the spot, patiently helped a number of novices, and was an extremely effective instructor. We enlisted her services again at Botany 2018 before she joined our lab, and she has been an integral part of our team for several subsequent workshops; in fact, she has now taken over leadership of our workshop team, developing curricular materials and organizing the workshops and personnel, as she did for our workshops at Botany 2019 and the recent Society of Systematic Biologists Standalone Meeting, held here in Gainesville in January of this year. She is also leading the hands-on portion of a CURE course (Course-based University Research Experience) for freshmen in the Honors Program that we are teaching on ecological niche modeling and forecasting the future distributions of Florida plants.

Shelly's dissertation research plan is of her own design, although we are very committed to the topic of autopolyploid evolution. Her project actually builds on the work she did as an undergraduate visitor to our lab in 2017. She discovered that the diploid, triploid, and cytotypes of the angiosperm *Galax urceolata* in the Appalachians have largely overlapping ecological niches. Her dissertation research will expand on this work by exploring in greater detail the possible origins of the polyploid cytotypes and by investigating ecological divergence among them based on soil chemistry and microbiome features of each cytotype. She has already developed many of the analytical skills needed for the proposed work, and given her tenacity and talent, she will be able to gain any other knowledge, training, or experience without difficulty. She has clearly demonstrated an ability to think creatively.

Her proposed project for IAPT will lay the foundation for all further aspects of her dissertation research. Based on available herbarium specimens and data from the literature, Shelly conducted the ecological niche modeling analysis described above. However, the number of specimens with chromosome number or ploidal level annotations available either online or in physical collections was quite small, limiting somewhat the extent and accuracy of the models. In addition, as her work moves forward, she would like to explore larger patterns of polyploid origins, gene flow, etc. – and she needs to be able to select appropriate sites and populations for study. She therefore proposes to sample a number of populations of all three cytotypes, georeference the voucher specimens, annotate them with ploidy and chromosome number from flow cytometry, digitize the specimens (capturing both data and images), and submit them to iDigBio as a community resource of ploidy-annotated specimens for what Stebbins referred to as the best example of an autopolyploid system in nature. This work should be of interest to IAPT, as she will obtain training in multiple aspects of plant taxonomy and systematics. Through her work as a Research Assistant with iDigBio, Shelly is adept at using digitized herbarium data; through this project, she will also learn how to generate the data.

Shelly is also an enthusiastic advocate for both plant biology and women in STEM. As with her research, she has already demonstrated her commitment to both communicating science and broadening participation. She helped organize and host a plant science research day at the University of Central Florida as an undergraduate, and she recruited undergraduates from the University of Florida to participate in the research symposium that was part of the event. She was a role model for other undergraduates and also for graduate students as well! Since becoming a graduate student, she has continued to explore new opportunities for service. Earlier this academic year, she was elected to serve as one of two graduate students nationally to represent students on the Board of Directors of the Botanical Society of America. In this capacity, she works with the BSA to develop programs and policies that benefit all Society members, but especially students. Shelly also works with high school girls from low socioeconomic levels in a weekly Girls Who Code group to teach coding skills. She is already having a huge impact on both UF and the larger botanical community, and her proposed work will certainly inspire others to pursue careers in science.

Shelly Gaynor will be a star. All of her accomplishments have earned her an NSF Graduate Research Fellowship, which will provide a stipend for three years of graduate school, beginning in fall, 2020. However, it provides only minimal research support, so Shelly is actively pursuing funding to cover her fieldwork and lab expenses. All that she has accomplished to date has been within the constraints of an undergraduate science curriculum and a year and a half of graduate school. I am excited to watch her career unfold.

I strongly support Shelly's application and consider her an outstanding candidate for support from IAPT.

Sincerely,



Pamela S. Soltis
Director, UF Biodiversity Institute
Distinguished Professor and Curator
Florida Museum of Natural History
University of Florida