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Biology Search Committee
Department of Biological Sciences, St. Edward's University
John Brooks Williams Science Center – North
Austin, TX 78704

Dear members of the search committee,

I am writing to express my interest in the Assistant Professorship in Physiology at St. Edward's University. I am an animal physiologist interested in the evolution and function of eukaryotic energy production and homeostasis at scales ranging from the molecular to the organismal to the population. As a Catholic evolutionary biologist, I can speak with particular authority to students of faith, and I am deeply committed to the Congregation of Holy Cross's core mission to provide a rich and varied education to a diverse range of students in the Biological Sciences. I am also particularly excited to engage undergraduates in research at the Wild Basin Creative Research Center.

Central to my research is the question of why, after nearly a billion years of evolution in uncounted lineages, are the genes encoding energy production in animals still inherited separately? A century and a half of careful investigation into eukaryotic genetics has yielded no answers. Perhaps even more fundamentally, we still do not understand the consequences of separate inheritance of nuclear and cytoplasmic genomes for eukaryotic function and fitness. My research into the evolution of eukaryotic energy systems, as detailed in the attached research statement, has provided several promising clues. Indeed, I have recently discovered evidence of rampant intra- and inter-molecular recombination in mitochondrial genomes of *P. antipodarum*. After decades of hot debate, this conclusive finding will forever change the way in which we understand animal mitochondrial genomes, their evolution, their expression, and in the process, will open completely new avenues of investigation. Combined with my graduate research in which I documented extensive heritable variation for mitochondrial function in *P. antipodarum* lake populations (Sharbrough *et al*., 2017, *Journal of Heredity*, featured cover article), I have established this snail as a useful model for understanding the evolution of energy production in animals. Since then, my research has continued to investigate the evolution of energy production genes and traits in *P. antipodarum* (Sharbrough *et al*., 2018, *Evolution*; Greimann *et al*., 2018, BioRxiv, in revision for *Integrative and Comparative Biology* [this paper was a product of my undergraduate mentee Emma Greimann's thesis project]), as well as other useful systems like humans (Sharbrough & Havird *et al*., 2017, *Genome Biology and Evolution*), *Drosophila* (Beck *et al*., 2015, *Evolution*), *Arabidopsis* (Sloan *et al*., 2018, *The Plant Cell*; Forsythe & Sharbrough *et al*., 2019, *Genome Biology and Evolution*), and a diverse array of polyploid plants (Sharbrough *et al*., 2018, *American Journal of Botany*). At St. Edward's, I look forward to investigating and educating others on the fascinating and complex aspects of the evolution of energy production in eukaryotes.

At my core, I am a lifelong learner dedicated towards bringing that knowledge and understanding to as many and as diverse a student population as possible. As described in the attached

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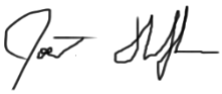
statement on my teaching philosophy and my statement on diversity and inclusion, my early experiences as a high school teacher at Mishawaka High School, Mishawaka, IN and later as an award-winning teaching assistant at the University of Iowa have made me passionate about teaching young biologists, and I will carry that passion into helping young people begin their own lifelong journeys of learning at St. Edward's. My undergraduate education at the University of Notre Dame and St. Mary's College give me a unique perspective on educating students of faith in the Biological Sciences that helps students reconcile their religious beliefs with the theory of evolution. I am also deeply committed to involving undergraduates in biological research and broadening participation in the life sciences, and to that end, I have directly mentored 10 undergraduate students in research projects during my time as a graduate student and postdoctoral scholar. I believe that involving the public in our shared scientific endeavor represents a critical function of our profession, and in support of that belief, I designed and implemented the high school outreach program of the Iowa City Darwin Day organization as well as an invasive species module designed for Special Education students at Taylor Elementary, located in Cedar Rapids, Iowa.

I am thoroughly excited by the opportunity to build an undergraduate research laboratory at St. Edward's University that will feature an inclusive and supportive culture, and engage in science that can improve the world. My expertise in techniques ranging from computational to molecular to organismal, in species ranging across eukaryotes, in fields ranging from genetics to physiology to evolution, and commitment to a Catholic education make me an ideal fit for the St. Edward's Biology Department. I am recommended for this position by five outstanding biologists: Drs. Maurine Neiman (University of Iowa), Daniel B. Sloan (Colorado State University), Kristi L. Montooth (University of Nebraska-Lincoln), Dr. Jonathan F. Wendel (Iowa State University), and Jeffrey L. Boore (Translational Systems Medicine Providence St. Joseph Health & Institute for Systems Biology). Please do not hesitate to contact me for any additional references or questions about my application. Thank you for your time and consideration.

Sincerely,



Dr. Joel Sharbrough, Ph.D.
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