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Genetics Search Committee
Department of Biological Sciences
2023 G St. NW
The George Washington University
Washington, DC 20052

Dear Search Chair:

Please accept my application for the Genetics faculty position advertised in the Department of Biological Sciences. My research program uses a systems biology approach to explore the mechanistic causes and evolutionary consequences of adaptive variation in reproductive traits. I am especially interested in how sexual selection influences genotypic and phenotypic divergence among populations and species. To this end, my research uses a multidisciplinary toolbox spanning comparative approaches across species, whole-genome association mapping, genotyping and expression microarrays, behavioral observation, cellular energetics, and cell morphogenesis. Recent projects on the organismal end of the continuum include resolving how sperm competition works in several closely-related species of *Drosophila* as well as in hybrid matings between two recently diverged species that show conspecific sperm precedence as a form of reproductive isolation. My current research takes a molecular shift along the continuum toward genotype-phenotype mapping, investigating the genetic basis and functional significance of the extraordinary morphological diversity found in sperm cells across Metazoa. Complementary to this goal are experiments quantifying functional interactions between sperm traits and female reproductive tract morphology that might influence paternity success during sperm competition. My future research goals delve into cell biology by generating a novel field of evolutionary development of spermatogenesis that will address the specific genetic and molecular mechanisms of sperm morphogenesis within an evolutionary framework.

These interests have arisen from my diverse background using several taxonomic systems to investigate the ecological, evolutionary and genetic processes promoting genetic and phenotypic variation. My doctoral thesis with Dr. Stevan Arnold at Oregon State University

explored the population genetic structure of a vertebrate metacommunity within an ecological and adaptive context. As an NIH NRSA Postdoctoral Fellow with Dr. Stephen Palumbi at Hopkins Marine Station of Stanford University, I examined population-level sperm morphological variation as well as gene expression profiling associated with within-population variation in sperm morphology. I have continued my focus on sperm dynamics in my current postdoctoral position with Dr. Scott Pitnick, where I am using transgenic lines of *Drosophila* with fluorescently labeled sperm heads to elucidate evolutionary genetic mechanisms of sexual selection. Our work describing mechanisms of sperm competition in *D. melanogaster* was recently published in *Science*, and our ongoing effort to identify sperm length genes using RAD QTL mapping and Illumina sequencing was funded by the National Science Foundation. Another NSF grant to resolve quantitative genetic male and female contributions to post-copulatory sexual selection is currently under review.

Complementary to my research interests, I have extensive teaching experience in the field, classroom, lecture hall and teaching laboratory that has shaped my pedagogical philosophy and strengthened my commitment to education. Beyond teaching courses, I have also been engaged in mentoring a host of undergraduates and graduate students many of whom are underrepresented minorities. I am currently teaching a graduate seminar on grant-writing, and I have served on two graduate committees, one overseeing a doctoral defense, and the other participating in a qualifying examination. I have also recently served on an NSF review panel for Evolutionary Genetics.

Should my application merit, letters of reference can be requested from Stevan Arnold (arnoldst@onid.orst.edu; 541-737-4362), Scott Pitnick (sspitnic@syr.edu; 315-443-5128), and John Belote (jbelote@syr.edu; 315-443-3695).

I would welcome the opportunity to further discuss my current and future research plans with members of the Department of Biological Sciences. Thank you for considering my application, and I look forward to hearing from you.

Sincerely,
Mollie K. Manier