
Hummingbird Sugar Rush: Engaging with Underrepresented Groups in Science

Major Goals. The goals of this outreach initiative are twofold: **1)** Provide an inclusive learning environment in which to scientifically explore the wonders of animal behavior, and **2)** Empower youth from underrepresented groups to engage in STEM in transformative ways. These goals will be accomplished in the context of my graduate research on the varied and mysterious foraging behaviors of hummingbirds.

Biological Background. In North America, we generally think of hummingbirds as flashy, pugnacious birds that make their presence known to us through buzzy chirps and epic aerial battles over feeders. But in the dense, misty tropical rainforests of South America, hundreds of species of hummingbirds must overcome fierce competition to obtain food in numerous ways. These tiny birds have two major foraging strategies: territoriality (defending small patches of flowers) and traplining (routinely visiting, but not defending, widely spaced flowers). While territorial hummingbirds usually have shorter and straighter bills, letting them visit many kinds of flowers that generally contain less concentrated nectar, trapliners have longer and curvier bills, restricting them to fewer, more specialized flowers—but ones that often have more concentrated nectar.



Main Activity. This ABS funding supports a “Hummingbird Sugar Rush” curriculum, featuring a choose-your-hummingbird, life-sized interactive game. Players can choose to “become” a territorial or traplining hummingbird (Sparkling Violetear and White-tipped Sicklebill, pictured above left and right, respectively), each of which is equipped with strengths and weaknesses depending on its foraging strategy. In the game, a territorialist’s strengths will include fighting ability and access to multiple kinds of flowers, but its weaknesses will include less endurance and less reward collected per flower visited. A trapliner, on the other hand, will have strengths of greater endurance and more reward per flower visited, and weaknesses of poor fighting ability and access to only one kind of flower. Just as hummingbirds must weigh the energetic trade-offs of searching for food, fighting to have sole access to it, and visiting flowers with more- or less-concentrated nectar, so must the players.

Deeper Dives. In order to broaden students’ understanding of this behavioral system, the “Hummingbird Sugar Rush” curriculum also includes two “deeper dive” activities relating to hummingbird foraging: **1)** examining real museum specimens to discover how bill size, shape, and weaponized tips (for instance, serrated or lancelike) can affect a hummingbird’s ability to access different flowers or compete with other birds; and **2)** use refractometers and simple measurements of viscosity to determine how a given flower’s nectar concentration can constrain a hummingbird’s energy budget (and ability to feed efficiently).

Partnership. To develop this curriculum, I have partnered with the UW’s Burke Museum “Girls in Science” (GiS) program, which is designed to inspire the next generation of researchers by connecting middle school students with womxn scientists, Indigenous Knowledge Holders, and real UW lab experiences. GiS exists to help address inequities in STEM fields by building student confidence, interest, skills, and knowledge through exposure to a variety of scientific fields and the mentorship of leaders from the Burke Museum and UW. GiS is offered free of charge with an application process open to all, and strives to serve students who are unconfident in science, but curious to learn more—especially students who may not otherwise have access to female role models or STEM resources outside of school, or who are from populations that have been historically underrepresented in STEM (womxn, Black, Indigenous, and Students of Color).

Impact. Since its inception in 2014, GiS has provided in-person programming to 258 students in 18 sessions. In 2021, the program temporarily moved to a virtual model; as a part of that effort, I helped serve more than 800 students via an iNaturalist activity on the application of citizen science to ornithology. GiS alumni have expressed having more confidence in their ability to do science after taking part in the program, and a better understanding of what it means to be a woman working in STEM. The support of ABS enables us to successfully launch this curriculum for a cohort of approximately 20 students, and to instill fearlessness and empirical curiosity in young students who face many societal pressures to leave science to others.

Logistics. We intend to launch this curriculum in September 2022, once we have had time to fully develop and beta test the game. Aside from each cohort of 20 students, we will also encourage applications and STEM engagement by providing free gallery admission to all applicants (plus a guardian) so they can see ornithologists at work in the Burke’s viewable labs. Furthermore, the program will adhere to best practices in youth safety and privacy in full compliance with UW’s Administrative Policy Statement 10.13 and the latest DOH guidelines for interacting with youth during COVID-19.