



NEIL DAVEY, Montgomery Blair High School, Silver Spring, Maryland, and
KATIE BARUFKA, Langley High School, McLean, Virginia
PROJECT: Deletion of Endonuclease G disrupts mitochondrial homeostasis and leads to reduced virulence in the human protozoan parasite Leishmania mexicana
FIELD: Microbiology
MENTOR: Dr. Sreenivas Gannavaram, Center for Biologics Evaluation and Research, FDA

“Leishmaniasis is a serious health problem that affects millions of people around the world.”

Leishmaniasis, a debilitating disease spread by the bite of an infected sand fly, has no vaccine. In their research, Neil Davey and Katie Barufka focused on Endonuclease G, a gene that has been shown to have a role in maintaining mitochondrial functions in mice. By “knocking out” Endonuclease G from the protozoan parasite *Leishmania mexicana*, the team was able to create a live-attenuated parasite strain with reduced virulence. The research could have potential applications in leishmaniasis vaccine development.

Neil Davey

Hometown: Gaithersburg, Maryland

“Science and technology are exciting fields that are constantly evolving. The most interesting trend for me is the greater overlap of the biology and engineering disciplines.”

Neil, a junior, was a finalist at The Indus Entrepreneurs (TIE), a global entrepreneurship competition. He holds two patent applications related to autonomous robots and one protecting the SWAP business plan. Neil is a member of the Science National Honors Society, where he tutors students in science, engineering and math. He is also an AP Scholar with Honors and a member of the varsity tennis team. Fluent in Sanskrit, Gujarat and Hindi, he volunteers and teaches at Samskrita Bharati, a nonprofit organization that promotes spoken Sanskrit. Neil plans to study biochemistry, finance, and/or South Asian Studies (Sanskrit). He would like to work in the field of drug and vaccine discovery, and eventually become a CEO of a pharmaceutical company.

Katie Barufka

Hometown: Reston, Virginia

“There are always new things, new answers, new cures to be discovered. Math and science are like puzzles, but the answers are infinite.”

Katie, a senior, has a deeply personal connection to her research. Her mother has struggled with Lyme disease for the past nine years. Similarly to Lyme disease, Leishmaniasis is transferred to humans through an insect bite and there is no FDA-approved vaccine. “Although I knew that I would not develop an vaccine on my own, helping even a little towards the goal of developing an effective vaccine gave me great satisfaction.” Katie placed first in her high school science fair, earned second place in the regional science fair, and was selected to the National Honor Society. She is the winner of the Student Athlete award, a member of the Science Honor and Leadership Honor Societies, and captain of her high school cheer team. She is considering a career in the medical field.