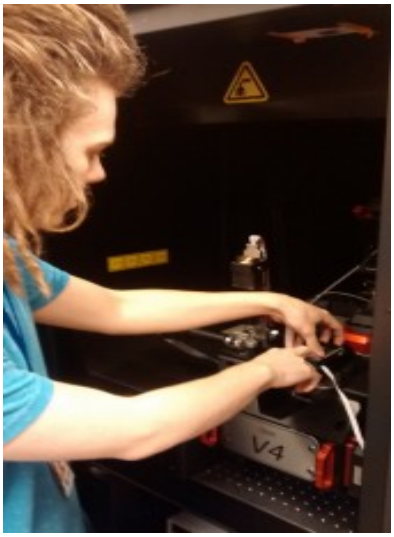
# Student Research Spotlight: A Summer at the NIH

by J. Taylor Meinhardt '16

This past summer, I had the incredible opportunity to take part in a summer research internship in the John Hammer Lab of the National Heart, Lungs, and Blood Institute (NHLBI) of the National Institutes of Health (NIH) in Bethesda, Maryland. This opportunity was made possible thanks to a wonderful collaboration between my advisor and professor Mike Wolyniak and post-doctoral researcher Dr. Sricharan Murugesan.

This past year, "Srich" visited Hampden-Sydney to conduct a lab module with Dr. Wolyniak's Molecular and Cell Biology class. Through this collaboration, I met Srich and became interested in his field of research. Srich's research involves investigating the proteins that are responsible for assembling the cytoskeleton in T cells. Specifically, these proteins are the actin matrix at the immunological synapse that forms when an antigen-presenting cell like a dendritic cell or a macrophage activates a T cell.

The project that Srich brought to Hamdpen-Sydney was incredibly exciting because it was directly linked to the research he was currently engaged in at the NIH. Having the opportunity to be involved in novel science was an invigorating experience that left a profound impact on me. In the actual project, we used shRNA plasmids to silence the expression of the proteins responsible for assembling actin at the immunological synapse. In addition to labeling actin and associated proteins with fluorescent tags, we were able to visualize the polymerization of actin in real time under fluorescent microscopy. In this way, we were able to obtain a preliminary look at the effects of altering these important proteins.

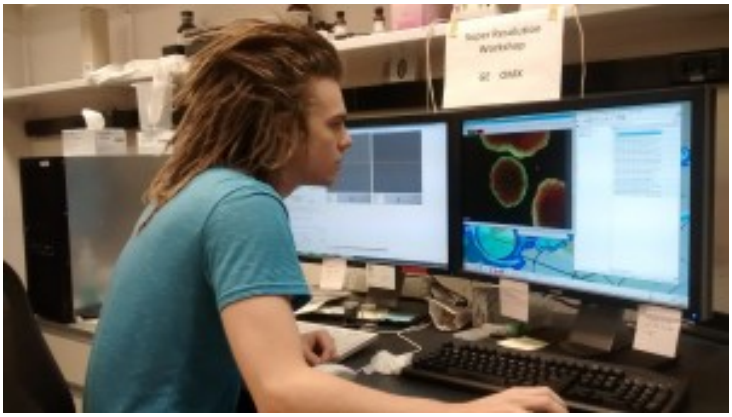


*Setting up a sample for microscopy*

Overall, Srich's lab is working to identify the specific protein(s) that are the most integral in assembling this actin structure in T cells. Nonetheless, this classroom module was still beneficial because it provided an opportunity for Srich to gather a mass set of data of one specific experimental design of interest while simultaneously allowing our class to be exposed to modern, real-world research. After the success of the collaboration, Dr. Wolyniak wanted to continue the partnership. I had shown great interest in Srich's work throughout the class, so he asked me if I might be interested in pursuing it further. Before I knew it, I had a summer internship to work under Srich for 2 months!

Once at the NIH, my project was an extension of the Srich's research. He is currently trying to determine which formin protein is the key player in assembling actin at the immunological synapse. So, my lab partner and I were each assigned a single protein from this category to study during my time there. Because neither of these proteins had yet been evaluated by Srich's lab, we were helping to advance his project by conducting research on proteins of interest while Srich was able to focus on other proteins that were already showing more promise.

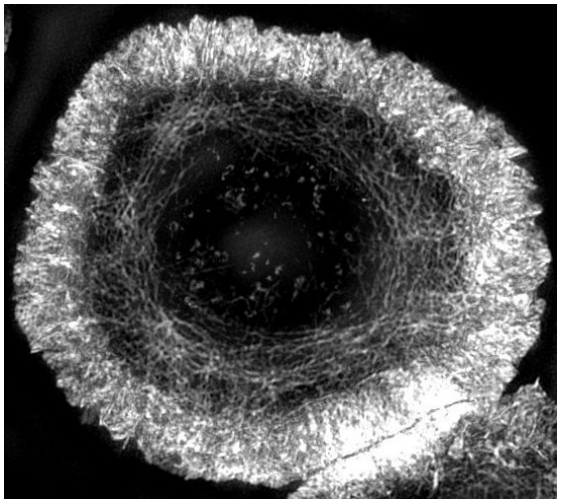
Of course, I still have a ways to go if I hope to pursue my own career in research, but it was beyond rewarding to be able to conduct novel research of my own this past summer. In the beginning, Srich taught me how to do the same experiments he conducted everyday, and it was not long before I was running them myself! I was also able to take part in the weekly lab meetings where each researcher presented their research progress over the past week. These hour-long meetings were fascinating because I was exposed to a variety of incredible and groundbreaking research since everyone was working on something different. I appreciated the constructive environment that existed and the genuine input everyone had for each other's research. Overall, it was incredible to be able to experience a research-oriented work place, as I was very curious about the dynamic beforehand. At the



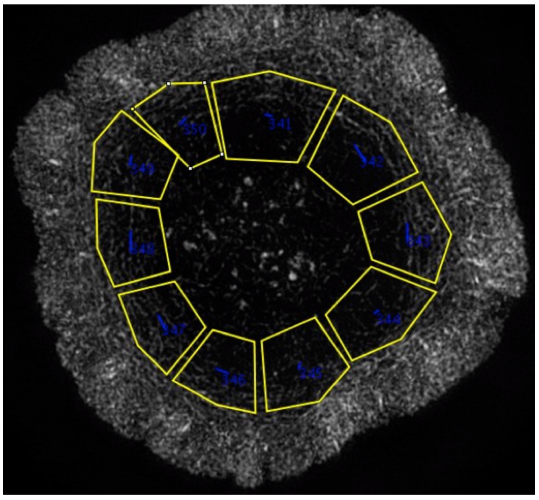
*Using the Deltavision OMX fluorescence microscope to observe actin cables in mammalian cells*

conclusion of the internship, I was able to realize that this was one of my favorite parts of the experience. All in all, the John Hammer Lab at the NHLBI was a wonderful place to work, and I can only hope to be part of such a constructive environment in the future.

Without question, I loved my time at the NIH. It was an amazing experience, and I am incredibly thankfully to everyone who made this opportunity possible. I know Srich and Dr. Wolyniak have continued their collaboration and have made the same lab modules in the 300 level biology classes accessible to 200 level genetics students. I am happy to have been a part of this effort and I hope Srich and Dr. Wolyniak will continue to make research exposure possible for younger and younger students so that they too might find the passion I have found for it as early as possible.



*The use of specific antibodies lets one visualize the actin cables in a mammalian cell*



*By dividing up images into regions, it is possible to get an idea of the rate at which T-cell actin cables grown and shrink in response to immunological challenge*