

March 2019

BIOLOGY
DUKE UNIVERSITY



MATTHEW
APPRENTICE

HIGH SCHOOL APPRENTICESHIP PROGRAM (HSAP)



SARAH
MENTOR

WHAT GOT YOU INTERESTED IN THIS FIELD?

MATTHEW: Definitely my 4th-grade crawfish unit. In elementary school I poured my heart and soul into studying these fascinating creatures, learning all of their ins and outs. Every Friday after school, I stuck around to help my teacher feed and maintain the crawfish, observing their funny antics.

SARAH: I was always fascinated by marine organisms, especially fish and sharks. I remember being in second grade checking out the only book in the library on sharks for about the 20th time—they still used library cards and my name filled every line. For a long time, the highlight of my existence was sleeping over at the aquarium with my Girl Scout troop. However, like many young people, I had a lot of interests. I also enjoyed writing, and I wanted to be a novelist and I still do! It wasn't until I was in college and was studying upper level coursework, learning to SCUBA dive, and pursuing an independent research project that it occurred to me that I could have career in scientific research and education.

ADVICE TO A STUDENT, JUST BEGINNING TO CONSIDER A CAREER IN SCIENCE?

MATTHEW: I would advise them to truly pursue their passions, take a gamble, and push themselves out of their comfort zone. Initially, I was concerned about moving across the country for a high school summer internship, but it ended up being one of the most amazing experiences of my life.

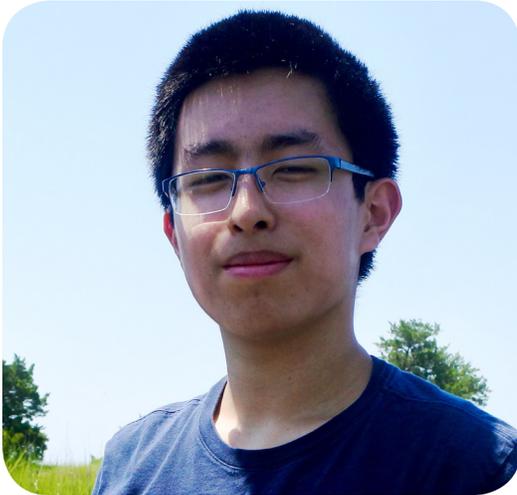
SARAH: I would recommend that they seek out hands-on research experiences in the specific areas they think they want to pursue, while also taking a breadth of coursework. For instance, even though my major was in biology, I am continuously grateful that I had exposure to statistics, computer programming, physics, chemistry, graphics, and writing in high school and college. These tools are pivotal to being successful, no matter what area of science you end up specializing in. I wish that I had been encouraged to take more of these classes while I was a student.



APPRENTICESHIP SPOTLIGHT

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MATTHEW APPRENTICE

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WHAT SPARKED YOUR INTEREST TO PARTICIPATE IN THIS FIELD?

My lifelong interest in wildlife, especially aquatic wildlife. I've always found mantis and pistol shrimp interesting, so I knew researching the biomechanics behind their incredible abilities would be a perfect fit..

WHAT IS THE MOST IMPORTANT PART OF THE MENTOR RELATIONSHIP?

The chance to learn from an expert who really knows the field well. I'm extremely thankful for all the skills and insights I've picked up along the way. It's also incredibly rewarding to experience scientific research at the highest level, contributing and helping in any way I can.

HOW HAVE YOU BENEFITED FROM PARTICIPATING IN YOUR AEOP PROGRAM?

The biggest benefits were the opportunities to learn from the best in the field and the chance to experience research before college. I also got the opportunity to apply my skills learned in high school to real life situations.

WHAT HAS CHANGED FOR YOU SINCE PARTICIPATING?

Participating in this program has solidified my intent to conduct research in college. In addition, it revealed the vast interdisciplinary nature of biology, opening so many potential career paths for me to explore.

COULD SOMEONE BE A SCIENTIST EVEN IF THEY HAVE SOME FEAR OF MATHEMATICS?

I personally think mathematics and statistics is vital toward science. However, it is 100 percent possible to be a scientist with a fear of mathematics. I'm personally not very good at math, and I find it very intimidating at times. However, I've learned to embrace it and push myself harder with math so that it becomes an incredibly helpful tool rather than an obstacle. I joined the math team and took honors and AP level math classes because I knew it couldn't hurt to improve my math skills.

WHY DOES THE WORLD NEED SCIENTISTS?

The world needs scientists for a variety of reasons. One, for the sake of learning, as we still know incredibly little about even our own planet. Many phenomena remain unexplained today. In addition, there are pressing issues that desperately need to be solved. For example, climate change can have catastrophic consequences, so it's up to scientists to figure out solutions, such as how to negate the effects, slow it down, prepare for it, etc.



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SARAH MENTOR

POSTDOCTORAL RESEARCHER
BIOLOGY, **DUKE UNIVERSITY**

DID YOU HAVE A LIFE CHANGING EVENT THAT ALTERED YOUR PATH TO WHERE YOU ARE NOW?

I trace most of my current career path back to a single pivotal question. There was a point in my freshman year when I was considering switching out of the biology major. My grades were fine, but I wasn't feeling inspired by the introductory classes, and the level of competition among the other students was stressful. However, I was enjoying a single credit seminar about marine animals and conservation. At the end of the semester I told my professor, Dr. William Bemis that I really enjoyed his class, and I was interested in fish and marine animals. I asked him, "If I could only take one more course in biology, what should it be?" He suggested that I take the comparative vertebrate anatomy class at my university. I signed up for it, along with a class about evolution, simply because I didn't know much about it. Taking these two classes in concert changed everything. I realized that for my entire life I had been interested in anatomy and biological diversity, asking questions about ecology and evolution, without knowing the right words for these topics. I learned that there was exciting new research in these areas. After being inspired by a guest lecture by Dr. Amy McCune on the evolution of form and function in fishes, I decided that I wanted to try doing research in her lab. I worked with Amy for over three years on a project that eventually earned me Highest Honors and resulted in an award winning publication. That type of success, combined with amazing mentorship, really gave me the confidence to continue on in science. Looking back, I feel like everything began to fall into place because I asked the right question of the right person—and acted on their advice.

COULD SOMEONE BE A SCIENTIST EVEN IF THEY HAVE SOME FEAR OF MATHEMATICS?

Personally, I think that specialized training is necessary to be competent in a specific discipline, but having a broad set of experiences to draw from is what really makes someone excel. You can't think outside the box if you don't already know there is something beyond the box. I usually find that when I discover something new or come up with a creative solution, it is because I've drawn on another set of skills or knowledge. For me, this usually means realizing something about biomechanics or morphology by considering it in the light of comparative biology and evolution. Having a breadth of experiences seems to be especially valuable in today's climate, where there is a lot of emphasis on integrative and cross-disciplinary research.



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HOW DOES YOUR JOURNEY HELP OTHERS?

There seems to be this idea out there that you need to know what you want to be from an early age in order to achieve it and that you need to be consumed with your desire to achieve that one specific goal. I think both of those ideas are unrealistic for most people, and yet they are very pervasive, perpetuated in movies and TV shows. I see them reflected in the questions students ask me, about how early I knew I wanted to be a scientist and how many hours I work a week. It is easy for me to draw the lines in retrospect, to explain how I got here, but it didn't have to be that way. We ask kids this all the time, "What do you want to be when you grow up?" For most of my life, I always answered "J.K. Rowling." Sometimes, I still do, since I am still working on some fiction writing in my spare time. I am very proud to be a scientist, but it is only one part of who I am.

HOW HAVE YOU BENEFITED FROM PARTICIPATING IN YOUR AEOP PROGRAM?

Being a mentor and helping students develop projects is an essential part of the role of a faculty member, but as a postdoc I didn't have much experience in this capacity. As a mentor in the AEOP program, I took on the role of mentorship for two full-time students in very different stages. Matthew Huang was a rising senior in high school and Darby Finnegan was a rising Junior in college. One of the first things I learned was to keep my own mentorship style pretty flexible, to be able to adapt it to the needs of the student. I think that was an important lesson to learn early on in my career. This summer was also my first experience bringing students into the field [Duke Marine Lab, Beaufort, NC] to collect and film animals. It was immensely rewarding to see how this experience reinvigorated their interest in organismal research and inspired their projects to take on new directions. Their excitement to stay out for hours and hours collecting animals and observing their behavior reinvigorated my own excitement in our work. It was very rewarding for me, which is not something I expected. The

rewards keep on coming too. Matthew wrote about his AEOP project in his college application to Duke and was accepted early decision! When I heard, I started cheering at my desk.

DO YOU SEE THE IMPORTANCE OF INTENSIVE, SPECIALIZED TRAINING IN ONE FIELD VERSUS A BROAD, NETWORKS OF EXPERIENCES?

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DID YOU HAVE A MENTOR?

I have had many influential mentors along my academic journey. The most influential mentor was probably Dr. Amy McCune, my undergraduate research adviser. I would never have gone on to graduate school without her example and encouragement. She was the one who first told me I should consider graduate school. I remember thinking, "Who, me?" I knew nothing about what it meant to go to graduate school and get a Ph.D. I thought that only people who were brilliant, who had grown up being obsessed with something, who didn't get distracted by other interests or hobbies, went into the academics. In retrospect, I also thought that women basically had to give up getting married and having a family in order to be successful in science. Working with Amy over the years, I realized how wrong I was in these things. I always enjoyed the research, but she helped me see that I was pretty good at it too.

Each month AEOP features some of our program participants. Read what these current and future STEM leaders have learned and what they are up to now. If you're an AEOP alumni (student and mentors) and want to tell your story visit us here: www.usaeop.com/about/tell-us-your-story