Science Article

Woman Scientist Biography

Summary

The following project is an article that I wrote for a science writing course. For this project, we were asked to write an article on a female scientist and create a biographical piece that highlighted their work.

I chose an up and coming colleague at the start of her long trek at becoming a renowned female scientist. I focused on her collegiate research and the accomplishments she made early in her research career. At such an early stage, it was essential to note where she wanted to take her research and elaborate on the future outcomes she hopes to attain for herself and other women.

I wrote two versions of this article with the final draft shown below[1, 2, 3, 4]

Intended Audience

Client:	Mark Roth - Carnegie Mellon University Science Writing Course Instructor
Recipient:	Mark Roth - Carnegie Mellon University Science Writing Course Instructor

Completed Tasks

- Researched a woman scientist
- Interviewed twice
- Categorized notes
- Wrote a lead
  - Quote ending
- Drafted twice
- Workshopped
- Elaborated on specifics
- Developed a content structure for potential audiences

Developed Skills

- Revising and Editing
- Research
- Interviewing
- Organization and Structure
- Effective Leads and Endings
- Writing for a Lay Audience
- Information Structure
- Science Communication
- Journalism Tactics

The Equations of a Geneticist

Working with fruit flies, Carnegie Mellon student Kathryn Hanson helped discover how the presence of one gene reduced such damage, pointing to the possibility that doctors might one day slow the process of aging in human beings.

"We saw fruit flies become more resistant to oxidative damage after we stressed cells and measured the cells' viability. It's an interesting discovery because it's beneficial for humans – we could potentially figure out how to increase oxidative resistance in our own cells."

That's how Kathryn Hanson, a Ph.D. genetics student at Stanford University, describes the undergraduate research at Carnegie Mellon University (CMU) that led her to Stanford.

Katie is a petite, rosy-cheeked, Midwesterner with bright blonde hair that quickly makes her recognizable in any photo. Upon meeting her, you find a young woman scientist who is kind, and is impressive but not boastful.

With two younger sisters and a childhood growing up in Nebraska, Katie devoted her time to academics and spending time with her sister. And though her life revolved around her education, she also found time to go outdoors with her friends, sing in her school choir, and play golf with her family. She excelled at learning and graduated high school with honors.

Starting at CMU, it wasn't immediately evident that she would end up studying genetics. She only knew that she loved both math and science and that she would one day pursue a Ph.D. She enrolled as a math major.

While most classes focused primarily on this subject, she took a first-year seminar that quickly opened new possibilities. "My biggest influencer in picking this career path was my undergraduate research advisor, [biological sciences Professor] Javier Lopez. I took his course my freshman year [after which] he offered me a spot in his lab for the summer. I accepted, thinking it would be a 'good experience' to try something outside my field," Katie said. "His lab worked on the genetics of aging, and I was pulled into a fascinating subject that I had yet to experience."

That summer was the hook that started her on her current path. It aught her that math could be applied to genetic research in a variety of ways, from sequencing genomes to population genetics and the variations they presented.

Taking a chance on that summer research led her into a 3-year project at CMU where she and others worked on understanding gene regulation in aging fruit flies, with hopes of one day delaying the onset of age-dependent disease.

While working in the Lopez lab, Katie researched the role of the stunted gene (sun) and its link to oxidative resistance in fruit flies. She mutated specific genes in the flies through the new technique of CRISPR/Cas9, and then measured the integrity of cell membranes in the flies to see how the genetic changes affected the cells' viability.

Specifically, her team was looking at how genetic changes affected RNA, which carries instructions for assembling proteins. "We [the lab] were interested in how RNA splicing patterns, how it is cut up and glued together, change during [the fly's] lifetime. What were the effects of that? Did aging induce the changes or did the changes induce aging?" Katie explained.

In doing that work, Katie discovered that reducing sun in fruit flies caused them to live approximately 30% longer. But, the more interesting part was when the gene was stressed: the absence of sun, fruit flies showed higher resistance to oxidative damage.

Oxidative stress (damage) is known to be a primary cause of certain diseases, such as cataract formation and rheumatoid arthritis. As organisms age, cells accumulate more damage due to oxidative stress. According to a 1997 study by the National Heart, Lung and Blood Institute's Barbara Berlett and Earl Stadtman, accumulated oxidized proteins also are associated with conditions such as amyotrophic lateral sclerosis, Alzheimer's disease, respiratory distress syndrome, and muscular dystrophy.

Katie's discovery offered exciting possibilities. If researchers could determine how to avoid oxidative damage in human cells, then one day, scientists potentially could learn how to prevent diseases associated with aging.

Discovering that gene manipulation makes fruit flies resistant to oxidation is why Katie continues to work. The critical points between the start of her work and where efforts show results spark her passion. "Those 'Eureka moments' are what make it hard to ever leave research," Katie said.

But research isn't the only career she sees for herself. Katie hopes to one day become a genetics professor and help push students to find their passion in the field as she once did. Genetics was a field where she couldn't just call on memorization to succeed. As a way of understanding the academic material better, she became a teaching assistant. The challenges and rewards of guiding students strengthened her commitment to the field.

Katie's goal is to become a professor, but the genetics teaching field is competitive. "As a woman in STEM [Science, technology, engineering, and mathematics], I fear that my dream job would require too many life sacrifices… but I know dedication could lead to upper-level positions [that] open doors for women like me."

In a male-dominated field, becoming a professor would take a lot of time and effort. While there are many female students in STEM today, most faculty are male. s women come into upper-level positions, though, such as department chairs or heads of their own labs, they could create more of a gender balance in the field, and women students would have more female mentors.

Katie's advice for women pursuing STEM careers is to build a support system. With strong mentors, such as Helen Wang, an adviser to the Charpie Scholars Program, to which Katie belonged, and the Dean of CMU's Mellon College of Science Rebecca Doerge, Katie was able to develop in her undergraduate career and transition into her life at Stanford. "Rebecca Doerge, especially, helped me navigate applying to graduate school and being a female in STEM. She continued to mentor me during my transition to graduate school and even met with me last time she was out in the Bay Area. People like that are what I want to be for others."

Katie's work hasn't slowed down. With three lab rotations in her first year of graduate research, she is still figuring which lab will be the center of her Ph.D. study. She just finished a lab that focused on cancer and the role p53, a commonly mutated tumor suppressor gene, plays in potentially suppressing cancer naturally.

Now, at her second lab, she's focused on embryonic and post-natal heart development and regeneration. The different projects focus on different stages, such as mice hearts regenerating during embryonic stages, but not after birth. The lab work could help researchers understand coronary artery disease.

Katie has yet to start her third rotation. She's eager to learn more but wants to patiently find where she fits at Stanford before jumping into a lab.

With feats such as receiving funding for research from CMU's Center for Nucleic Acids Science and Technology (CNAST) to holding positions as Vice President of Intellectual Development for Alpha Chi Omega, Public Relations Director for Women in Science, and Co-President of CMU Math Club, Katie understands that careful decisions help build careers.

"It's interesting to consider what would have happened if I hadn't taken that seminar course my freshman year. Would I still have found my way to genetics?" Katie asks. "Being a woman in STEM [is] definitely hard, but I don't think I'd change anything in my path."

[1]Berlett, Barbara S., and Earl R. Stadtman. "Protein Oxidation in Aging, Disease, and Oxidative Stress." Journal of Biological

[2]Chemistry. August 15, 1997. Accessed February 15, 2019. http://www.jbc.org/content/272/33/20313..#xref-fn-6-1.

[3]"Into Kathryn Hanson." Telephone interview by author. February 13, 2019.

[4]"Reactive Oxygen-Mediated Protein Oxidation in Aging and Disease." ACS Publications. Accessed February 15, 2019. https://pubs.acs.org/doi/pdf/10.1021/tx960133r.