



Celebrating the Outstanding Work of our Students

“Heroes and Role Models: Norman Borlaug and Ellen Swallow Richards”

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My heroes and role models are two American scientists whose work has improved the lives of tens of millions of people around the world. The Nobel Prize-winning agronomist Norman Borlaug and the nineteenth-century environmentalist Ellen Swallow Richards were scientists who made discoveries and then, with a very common-sense approach, put them into practice. Borlaug’s and Richards’ efforts laid the groundwork for hundreds of scientists who followed them and carried on their work.

When I think of heroes, I think of trailblazers. A trailblazer is someone who does something that has never been done before and who sets the foundation for future discoveries. What makes Richards and Borlaug heroes to me are the values we share: charity, hard work, community, education and self-reliance.

Borlaug and Richards were trailblazers. In the fields of agronomy and economic development, what set Borlaug apart from the rest was his determination to increase crop yields to a maximum in a way most integrated into the project areas. What set Richards apart from the rest was her application of science to solving problems of polluted air and water and malnutrition in families; she was one of the first scientists to see the human environment as interconnected life systems. Along the way, she did much to gain acceptance of women in higher education.

Another thing that they have in common is that their work had practical applications and directly improved the lives of people.

To me, understanding science is like constructing a building. You start with an idea - this is the foundation of the building. As you improve on the idea, the new ideas become the floors above the foundation. A trailblazer is someone who lays that foundation.

Borlaug laid the foundation for agriculturally-based economic development that could aggressively address the problem of hunger. Richards laid the foundation for numerous safety standards and many of the sanitation innovations we have today.

I first heard of Norman Borlaug in a television series hosted by the magicians Penn & Teller that debunked modern myths. The episode that included Norman Borlaug focused on food fads. Penn & Teller visited a group of young adults living in a nice beach house in Santa Monica, California, who ate, and advocated militantly that everybody should eat, only “organic” food. Penn & Teller challenged their ideas, arguing that while choosing to pay more for food grown the more expensive, organic way is something people with means can do, it’s not something the poorest can do easily.

Taking the public policy issue beyond privileged young adults in an upscale community in the richest country in the world, Penn & Teller argued that environmentalists who advocated against the use of inorganic, or chemical fertilizers in crop production were equally wrong-headed. A prominent figure in that debate and their hero in the fight against world hunger is 90-year old agronomist Norman Borlaug. Though a scientist, he was awarded the Nobel Peace Prize and not a prize in the sciences. Of the living American winners of the Nobel Peace Prize, he seems to be the least well known and least celebrated.

Over 60 years, Normal Borlaug has made enormous steps in preventing starvation in third-world countries through his work in the science and economics of crop production. He is the father of the Green Revolution, a movement in the field of agricultural development in which scientists worked to produce more food from less land, thereby saving millions from starvation. He has greatly benefited humanity and I admire him for that.

I think the reason that he appeals to me is that he applied himself in a field of science in a way that directly helps humanity. He combined scientific research with helping people instead of working for a big agro-business. And his work went far beyond the laboratory. Beginning with a grant from the Rockefeller Foundation in 1943, he went to Mexico and established the first of many research and teaching programs that intensified and spread his efforts to develop high-yield, hardy grain crops in the neediest countries.

Today his centers and programs are at work in 16 countries in Africa, Latin America and Asia, and are multiplying his efforts many times over.

The program in Africa, called Sasakawa-Global 2000, has an education fund that helped over one thousand agricultural extension agents get university degrees between 1993 and 2003. And the number of African farmers touched by his programs? Millions.

Far from holing up in an office or a laboratory directing the work of the program scientists, Dr. Borlaug has always worked with them and local farmers in the field. Borlaug and his trainees work 12-hour days in the fields alongside the farmers.

Norman Borlaug was born in Cresco, Iowa and was 19 years old when the Dust Bowl hit in the mid 1930's. It was a period of devastating dust storms that ravaged an area of the Midwest, ruining livelihoods and lives.

Before the Dust Bowl, farmers didn't practice soil conservation and aggravated erosion by pulling up soil-holding grasses and planting more and more cash crops like wheat. They misused the land until just the wrong kind of weather conditions came along and caused the dust storms that blew away tons of the top soil necessary for crops. Norman Borlaug was in his second year of college when the Dust Bowl began and 27 years old when it ended, three years before he started working with the Rockefeller foundation.

He first started working on raising grain harvest yields in Mexico in 1943. He was supposed to teach Mexican farmers new farming techniques, but he found himself creating new varieties of grain. He became interested in dwarf wheat, because it would grow almost anywhere and has a resistance to insects. It is also easier to harvest.

In 1963, Borlaug went to India and Pakistan to help alleviate hunger. At first, his idea to switch to crops with higher yield (like wheat) met resistance, but by 1965, the hunger problem was so bad that the Indian and Pakistani governments accepted using dwarf wheat. The Indians and Pakistani's were resistant to wheat because they had been eating rice for generations; wheat was a foreign substance to them. Some felt that western culture was being forced on them.

Then war broke out between India and Pakistan. Nevertheless, even with the war, hold-ups by the Mexican and U.S. governments, the fact that the seeds were sowed late and that they germinated badly, yet yields rose 70 percent.

In the 1980s he met a growing tide of resistance from environmentalists who denounced his support for inexpensive chemical fertilizer and who argued for the use of animal manure. But manure requires animals to consume food that people in Africa and India couldn't provide for themselves, let alone for animals.

Nonetheless, the movement weakened support for Borlaug's work and along with it the funding necessary to continue it.

Borlaug said his environmental critics meant well but were elitists. "They do their lobbying from comfortable offices suites in Washington or Brussels. If they lived just one month amid the misery of the developing world, as I have for 50 years, they'd be crying out for tractors and fertilizer and irrigation canals and be outraged that fashionable elitists back home were trying to deny them these things," he said in a 1997 profile in *The Atlantic*.

Preserving the environment is important, but not everyone in the world can afford the luxury of organically grown food. Science doesn't support the idea that inorganic fertilizer will permanently destroy land, or that it will harm people who eat the food. A good thing about high-yield crops is that you get more crops on less land, so you don't have to chop down trees and can leave more land untouched. Borlaug unwaveringly argued that using organic fertilizer was a luxury that farmers in India, Pakistan and Mexico just couldn't afford.

Ellen Swallow Richards

Another hero to me is nineteenth-century woman scientist, Ellen Henrietta Swallow Richards. She was one of the first people to call attention to practical issues of health and safety in the home, giving shape to the science of home economics. She advocated a new branch of science called oekology, which was a combination of nutritional issues and teaching about the environment. She taught about sanitation and nutrition and she was the founder of the American Association of University Women, an organization that both of my grandmothers belong to.

I came across Richards' story when I was researching women scientists. What interested me was that she, across several different scientific fields, researched ways for people to live better, healthier lives. Her findings could be used to help just about everybody.

Ellen Henrietta Swallow was born on 1842 in Dunstable, Massachusetts. Like my mom, both of her parents were teachers, and her father owned a farm. She enrolled in Vassar College, which admitted only women at that time, in 1868, and then later at the Massachusetts Institute of Technology, which until that time had only admitted men.

The story of her admittance into MIT says a lot about her integrity. She was admitted free of charge, but also, unbeknownst to her, secretly. At first, she thought the waiver of charges was because of her inability to pay full tuition, but later she found out that it was because the president of the college didn't want to acknowledge that she, a woman, was learning there. If she were off the books, he could truthfully say that she wasn't a student there.

When she found out about her unofficial status, she was furious. She said that if she had known the circumstances of her admittance at the beginning, she would have never gone.

Still, she persisted in her studies and her research. Her eventual marriage to MIT professor Robert Richards gave her financial security and allowed her to devote her energies to science and to the advancement of female scholars. Ellen Richards became an expert in a number of fields, including the chemical analysis of water, air and food; and nutritional requirements. She established the Women's Laboratory at MIT and taught female students chemical analysis, industrial chemistry, biology, mineralogy, health and finance. Richards also did environmental research for the government and private industry, testing for arsenic in fabrics and wall coverings.

After thirteen years, in 1883, Richards achieved her goal of getting women admitted into regular degree programs at MIT and was able to close the doors on the Women's Laboratory forever. The next year, Richards became an instructor of sanitary chemistry in MIT's new chemical laboratory. She conducted the first major analysis of the state's entire water supply and then spent the next 27 years teaching classes in how to analyze air, sewage and water.

She also helped found the Seaside Laboratory for the study of ocean and inland waters, which in time became the famous Marine Biological Laboratory at Woods Hole.

Before Richards died in 1911, she began the home economics movement. She helped found the American Home Economics Association, a group my Granne also belonged to. At the same time, Richards was teaching chemical sanitation techniques to people who went on to develop municipal water-treatment and sewage facilities.

Coincidentally, while I was doing my research on Ellen Richards, there was an op-ed piece in the New York Times about Larry Summers, the president of Harvard, and his controversial comments about the reason that so few women get into large, prestigious schools like Harvard. The article cites Richards as a woman who tried to get an education and failed so she settled for marriage.

I couldn't disagree more with the way the op-ed writer denigrates Richards and her work. Richards didn't fail, and she didn't give up. In the days before public research grants, she used the economic stability of her marriage to fund her work. She basically invented home economics, which requires knowledge in chemistry, the environment, biology, and other fields.

The article treats home economics as "the analysis of cleaning products." But home economics was much more than that. It combined many useful fields into something that could help all people on the socio-economic scale, and the way it helped was very practical, just simple innovations that can make people's lives safer and healthier. Today, the work of that early home economics curriculum is being advanced by students, both men and women, in the different fields that Ellen Richards brought together.

Her work toward better nutrition and sanitation and her efforts in establishing a field of study about both have contributed to an increasing life expectancy for Americans -- from 47 years in 1900 to 75 by the mid-1990's.

Learning about Norman Borlaug and Ellen Richards has taught me some things about myself, influenced my actions and shaped my beliefs. Although neither is Jewish, I feel drawn to them because of their accomplishments.

I may not choose the paths of these two heroes of mine, but because of them, I want to use my talents and skills to improve people's lives. Science is my favorite subject in school and from what I've studied so far I have seen ways to help humanity. I think that if I choose to be a scientist, I would want to help people in the way that Norman Borlaug and Ellen Richards have.

What I've taken away from my study of these two heroic scientists is that science isn't just arcane study for study's sake but something that has powerful, practical applications that can help a lot of people in a direct and profound way.