

Doing It With Heart

I developed an interest in bioengineering right after graduate school. The company where I got my first job, the corporate research and development center of W.R. Grace & Company in Columbia, MD, had many biotechnology projects. I became tangentially involved in several of them. In the early 1980s, biotechnology and molecular biology were exciting new fields. I was drawn to that excitement.

At first it was a challenge to understand the culture of life scientists. I came to biology with a different set of questions than biologists. I was not unwelcome, but probably viewed with a degree of skepticism.

It takes a certain amount of empathy to learn to think like someone else and understand a different point of view. That is perhaps my greatest asset, which enabled me to make the transition to biomolecular engineering. It is also a very humbling process for an engineer to try to understand biological pathways and mechanisms through equations. Nature is not very accommodating.

My research depends on ongoing interactions with life scientists and physicians. For example, I am trying to develop an implantable biochip to monitor lactate and glucose levels in tissues. The context is framed by the need to make better decisions about patients who experience trauma; whether on the battlefield or in mass casualty situations. As a result, I need to work closely with an emergency physician, a physiologist, and a biochemist. Another of my projects, driven by the need for improved cancer diagnosis and prognosis, has to do with producing highly focused microarray chips for the genomic classification of primary brain tumors. In this case, I collaborate with a pathologist and a neurosurgeon.

On a personal level my work is extremely rewarding, but you get very little praise for developing "a system." I get kudos for publishing papers and presenting talks at meetings. In academia there is a problem with the perceived value of inventing systems. Traditionally, this has been the purview of industry. However, systems do present their own intellectual challenges.

I did not always know I would end up a scientist. My family ran a business in St. Juan, Trinidad, where I grew up, and I was expected to continue with that tradition. Initially I was in the language track in high school. But one summer, my sister, who was studying science, decided to tutor me in chemistry so that I could pass the interview to switch to the science track. She was convinced that I would be happiest doing science.

Her intuition might have had something to do with the fact that I was always dismantling all the clocks, radios, and TVs in our home. Nothing worked like it was meant to when I was done.

My parents did not discourage me to pursue my science studies, but they were not wildly enthusiastic either. In the Caribbean, there is no noteworthy research enterprise, so my career choice meant that I would have to leave the country. I moved to England to attend the University of Manchester Institute of Science and Technology (UMIST), as a graduate student. I then moved to the United States to do additional graduate and postdoctoral studies at the Massachusetts Institute of Technology (MIT), Cambridge, MA.

Aside from my sister, my doctoral supervisor at MIT, Gary E. Wnek, has been the most influential person in my career. Not only has he shaped my scientific inquiry but also how I mentor my own students. He is a great visionary and a great teacher.

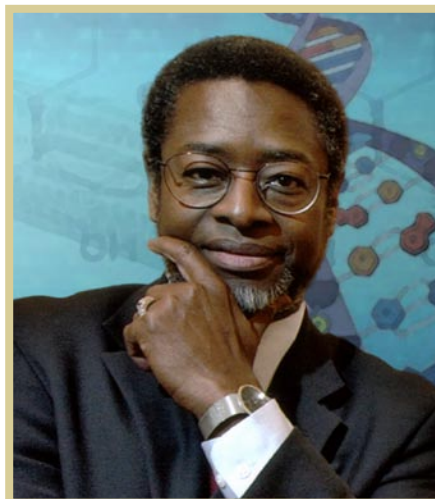
After my doctorate (Sc.D.) I was aggressively wooed by a number of companies until one made me an offer I could not refuse. In retrospect, I am eternally grateful that I spent 15 years in industry before being recruited back to academia. Eighty percent of undergraduates in engineering end up going to industry. To have empathy for what these students will be facing and to prepare them for those challenges, you need to know about industry.

I continue to be president and Scientific Director of ABTECH Scientific, Inc. in Richmond, VA, a company that develops near-patient biosensors for the therapeutic drug industry. My role in the company, which predates

my faculty appointment, keeps me centered as to why I do the research I do and why I teach students the way I do. I see the value of my work and what these applications forge.

But the number one job for me is preparing another generation of curious individuals who are equipped to take on the research of the future. I really enjoy working with young people and teaching them the ropes. When they start lecturing me, I know that I have done my job well. I came to be a mentor late in life, but it came easily to me. In a way I have always been a closet professor.

The fundamental character trait that I look for in my students is what I call "heart," although people give it different names. Ours is an enterprise of failure. Despite our best intentions, we are not always successful in revealing the truth. Because of this, we need to have heart, drive, and commitment. These qualities can make up for a lot of smarts.



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*As told to Laura Bonetta,
a science writer based in Bethesda, MD.*