

November 2011

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Recommended Citation

Guyden, J. C. (2011). A different kind of quarterback. *Molecular Biology of the Cell*, 22(21), 3926-3928. doi:10.1091/mbc.E11-05-0471.

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A different kind of quarterback

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ABSTRACT I am not big on celebrations, nor do I accept many invitations to receive awards. There is much work to be done, and the reward is in the doing. I learned this lesson early from my parents, Martha and Robert Guyden. However, I am humbled that anyone would even mention my name in association with E. E. Just. I, like he, was born into a segregated America, and somehow we both found biology. I think Just's life story instigates a discussion on diversity in science, as well it should. However, after reading Tyrone Hayes' (2010 E. E. Just Award recipient) essay from last year, "Diversifying the Biological Sciences: Past Efforts and Future Challenges" (Hayes, 2010), I have little to add on the subject. His words gave voice to my thoughts. That being said, I would like to use these pages to describe my journey into the "Cell" and the people who "hoed the row ahead of me."

I integrated myself into college. There were a few majority schools in Texas that accepted African Americans in 1970. It was not until 1972 that public integration was forced in Texas. My dream then was of becoming the first black NFL quarterback. Although I finished second in my class in high school academically, football was/is a religion in Texas, and playing 'ball had always been the primary focus of my life. I soon learned that America was not yet ready for a black quarterback at a majority college, and becoming an NFL quarterback was literally impossible. I realized that this was the end of my childhood dream, but could not give up athletics altogether. So I joined the track team, and for the next 2 years I majored in pole-vaulting, with a minor in math. Late in my sophomore year, I became conscious of the fact that there were no professional pole-vaulters in the United States, and math

was not my cup of tea. Although my mother and brother were mathematicians, in my mind there were no straight lines in linear equations.



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Now in my sophomore year of college, I had to figure out who I wanted to be, and I had no images of me in the future. I remember becoming ill while visiting my parents. I saw our family doctor the next day. He suggested an alternative, a career in medicine. And that was that. I would become a physician. I returned to school with a new purpose. My grades improved significantly. I was the only African American premed major at North Texas State University at that time, and I made sure I competed at the top of the class as I had plans of applying to medical school.

I worked hard to develop relationships with my classmates. We created study groups, many of which I led. Our test scores were always at the top of each class. In those days, comparative anatomy and physiology were the most difficult premed requirements. These classes were taught by one professor who also chaired the premed committee. At North Texas, candidates for medical school were required to apply through the campus premed committee. The unwritten rule was that your work had to meet the standards of the chair, and his primary requirement was that you aced his classes. The anatomy class consisted of both a lecture and a lab. I led most of our study sessions, whether the subject matter was associated with lab topics or lectures. Although I had one of the highest grades in lab, I received grades that were lower than other members of our study group on lecture exams. We

DOI:10.1091/mbc.E11-05-0471

Jerry Charles Guyden received the 2011 E. E. Just Award from the American Society for Cell Biology.

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Abbreviation used: TNC, thymic nurse cell.

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compared grades after each exam, and it was clear that I received fewer points for the same answers given by other members of the group. In fact, some of my tutees received higher scores than I. At the end of the semester, I received a "B" for the class. This professor was very strict with respect to grades. Ninety was an "A" and 89 was a "B." My grade average was 89.7. Every one else in the study group received grade averages above 92.

Again, now in the spring of my junior year, images of me in the future were taken away. Using anger as the prime motivator for my efforts, I continued to do well academically. In the last semester of my senior year, I was required to take genetics to complete the pre-med core. I segregated myself from the rest of the class by sitting in the far back of the class. Several rows separated me from my classmates. I promised myself that I would perform better than anyone in the class on every exam. Sometime in the middle of the semester, Professor David Busbee took longer than usual grading an exam. One of the "smartest" students in the class asked why he had not returned the graded exams. Dr. Busbee replied that the exams were graded, but not yet recorded in his grade book. The student then asked who made the highest score? Dr. Busbee answered in a very loud and booming voice, "Jerry Guyden." Now, this got my attention, and, as he continued to look at me, he asked if he could talk to me after class.

To this day, I do not know why Dr. Busbee asked me to work with him in his lab. I knew very little about research, and I knew nothing of his research interests. I knew I had to wear a white lab jacket, and I thought it would make me look good, kind of like a physician. More importantly, he said he would pay me, so I said yes. I soon learned that Dr. Busbee studied cancer. He gave me a large stack of papers and told me to read them before I could start my own research project. I was also required to attend lab meetings. One of the strangest concepts for me was getting paid to study. I checked every day with Dr. Busbee to assure myself that I was doing the right things to get paid. I thought work in labs involved something with test tubes and microscopes, like in lab classes. I knew no one who was a scientist. They did not exist in my world. Initially, this was nothing more than a summer job.

The Dr. Busbee lab studied the activity of aryl hydrocarbon hydroxylases. Many flat and planar multi-benzene ringed chemicals found in tar and cigarette smoke are metabolized by aryl hydrocarbon hydroxylases in the body to convert these potentially harmful chemicals into removable waste. Some of these metabolites, however, interact strongly with DNA. Now, for a long time, I had no clue about what was going on, but I did not want to be embarrassed in lab meetings, so I read extensively. In retrospect, I think most beginning scientists feel this way. One day, I thought I would give it a try. I thought I knew enough to design an experiment to isolate one of the metabolites of interest. I do not remember the details of the experiment, but I do remember the results. In the old days (before computers), the high-performance liquid chromatograph was attached to a ticker-tape machine. The results of an experiment were displayed on a long strip of paper streaming from the machine. I found myself, early one Saturday morning, standing in a small, dimly lit room awaiting my results as they came off the ticker-tape machine. I remember saying to myself, "It worked! It worked!" My next thought was, "Why am I here working so early on a Saturday morning?" The answer to this question changed my life forever. I reasoned that I was there because I wanted to be, that I was excited about my experiment... its results. I realized that I initiated the idea, created a plan, and executed the plan successfully. I was a quarterback again, and no one could take my hard work, thoughts, and ideas away from me. Visions of me in the future crystallized that Saturday morning.

The results of my work with Dr. Busbee produced two papers and a master's degree. During the last year of my master's program, I received a phone call (out of the blue) from a stranger. His name was Lovell Jones (you may remember him from last year's E. E. Just essay). He asked if I was interested in applying to the doctoral program in zoology at the University of California, Berkeley. I thought this was some kind of prank. How could anyone at Berkeley know me, my work? Neither was that important. He offered me a visit to the campus. He scheduled meetings with several faculty members, and he promised that if I joined the PhD program at Berkeley, I would have a fair chance of successfully completing the program. A fair chance was all I wanted.

During that visit, I met Steve Martin. Steve is British, and I was this young African American from Texas. Our initial conversation consisted mostly of "huh." It was like he was Russian and I was Caribbean speaking patois. Somehow we got through the conversation. I immediately realized that he was not only one of the brightest men I had ever met, but also he was an honest and good human being. He asked me to join his lab and I did. I do not think that Steve ever asked me to do anything throughout my entire tenure in the Martin lab. Steve taught by example. He did his work, and if you wanted to be a part of the lab, you had to keep up. That meant you had to read, design experiments, write proposals, and perform the experiments. I remember my first proposal looked like a stop sign when he returned it. I thought my writing abilities were at least adequate and took offense at several of his comments. I hurried back into his office and soon discovered that I had a long way to go to compete at his skill level. But that day, he threw down the gauntlet and presented the challenge. I like challenges. The work in the Martin lab was centered on oncogenes. We discovered that several retroviruses carry genes that produce cancer-causing proteins. Our work produced two papers, one in *Cell*, the other in *Virology*, and a PhD.

During my last year with Steve, I began looking for a postdoc position. Leon Wofsy in the Department of Microbiology and Immunology at Berkeley had a postdoc position open. I asked for an interview, and after our discussions, I realized that he was not very impressed when he said he would get back to me. What was *this*, and who was he? I thought I was the best thing since the discovery of black pepper. How could he not want me to work with him? I called and asked for another interview. This time our discussions were extensive, and they existed on two levels. First, we talked about the science, and he decided that I was capable and hired me for the job. We also talked about life issues. I discovered Leon was Jewish and from New York City. He came to Berkeley after finishing his undergraduate degree from the City College of New York. I also learned that he had marched in the civil rights movement led by Martin Luther King. One of his friends was Paul Robeson. He had autographed drawings from the famous artist Charles White, and he played ball in Grove Park with members of the Black Panthers. He also testified in front of Congress and J. Edgar Hoover's FBI. I knew I could learn from this guy, and not just science. In that moment, I also realized that he saw me as a human being, not a black man, but a man. Leon was looking for the best person for the job. If you happened to be black, cool. But being black was not one of the qualifications for the job. Being a good scientist was. He knew enough about black people, all people for that matter, to express his true feelings about my qualifications without fear of inadvertent cultural insults. So he treated me the way he treated every candidate. It was up to me to prove my worth as a scientist. During my time with Leon, we developed the first method for antibody-toxin targeting and killing of cells. It was Leon's idea to create a "silver bullet" specifically directed at cancer

cells. I must say that the science was amazing, but paled in comparison to his life lessons. It was Leon who influenced me to take a faculty position at the City College of New York.

During my 25 years here at the City College of New York, I have attempted to achieve two goals. First, I wanted to study the function of thymic nurse cells (TNCs), and second, to provide a safe and judgment-free zone to introduce young minds to science. TNCs are stromal epithelial cells of the thymic cortex. They are very unusual, because they internalize up to 200 developing T cells into specialized "cytoplasmic" vacuoles. Of equal importance is my commitment to training students for careers in science. We have successfully trained 68 young men and women from several different ethnic backgrounds and races (Caucasian, African American, Hispanic, and Asian) in my laboratory. Forty-eight were minority students. Individuals were trained at all levels of the educational process, from undergraduate to postdoctoral fellow.

Twenty-four of the students from underrepresented communities now have either a PhD or an MD or both degrees. Twenty-four are still in the pipeline. Our training methods have been successful and require the development of teams of people representing several different cultures and ethnic backgrounds working together toward accomplishing a scientific goal. Individuals working together day-to-day find common ground and establish lifelong relationships that will influence the cultural makeup of the next generation of scientists. I will continue to address the issue of preparing the next generation of scientists in the United States, which should include a significant increase in the number of individuals from all ethnic and racial backgrounds.

REFERENCE

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