

**University of Illinois Department of Chemistry**  
**Convocation Speech**  
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**May 14, 2017**

Thank you Prof Katzenellenbogen, Dean Hu, Professors Gruebele, Girolami, and the Faculty of the Department of Chemistry for the invitation to speak today to the Graduating Class of 2017.

**Congratulations** to the new degree recipients, this is your day. You have achieved your goal and are now ready for the next phase in your lives.

I also want to congratulate the parents, spouses, partners and all those that have supported you through this phase in your journey. As a parent of 2 college graduates and the husband of a wife who was there through my entire graduate school journey, today you can breathe freely because that weight is off your shoulders and that uncertainty is now behind you.

Believe me, I know the feeling.

When I was asked to give this convocation talk, my first thought was to recognize what a great honor this was to be asked by my alma mater to speak to the graduating class of 2017. However, I was also a bit

apprehensive. Yes, I have given many talks around the world on my research but this request was very different. I wasn't going to have a set of slides with lots of data and speak to you about the journey towards drug discovery. I was being asked to share with you some more personal words that would be meaningful to you as you look to your future. Now, I certainly don't consider myself a great orator, and I do not believe I have composed the "scientist's" version of the Gettysburg Address. But, I am going to tell you a story that starts off not very different from many of your own stories and in fact 33 years ago, I was right where you are today.

It begins in a small row home in Baltimore City where a kid became captivated by science through reading books from the public library. This interest was odd for the son of an Italian immigrant with an 8<sup>th</sup> grade education who was a barber and a mother who was a payroll clerk. But these parents of modest backgrounds instilled in their children the value of an education and **the desire to do something good with their lives.**

This is the quintessential hope of many immigrant parents even today, no matter where they come from.

I can't say that I was a very good student, but one day when I was 10 a teacher helped me overcome a potential reading disability and set the stage for my future. I then went on to attend a math, science and engineering magnet public high school, where again an incredible teacher first introduced me to chemistry and biochemistry and the concept of how molecules control functions in the human body.

From there, I entered Cornell University, a first generation college student and the first in my extended family to ever go away to college. At Cornell, it was my initial desire to get a degree in biochemistry, but I had no interest in counting fruit flies late into the night. It so happens that I was taking a course in organic chemistry. I found the concepts of building molecules incredibly fascinating.

Now, for a person from the low income section of Baltimore being at an Ivy League school was somewhat daunting and socially distant. But, I found a home in chemistry doing undergraduate research. A professor, Jerry Meinwald, took a chance on me before I had any real skills to contribute to his lab.

There, I got my first real taste of true laboratory research. I also got a taste of some sage advice. A very patient graduate student supervisor in Jerry's lab pulled me aside before I started my first experiment and warned me that **in research 80% of what you do will fail and only 20% will succeed. If you are not able to handle that, then research is not for you.**

It turns out that research was for me. I ended up getting hooked on drug design as a result of a summer internship at Johns Hopkins School of Medicine, an internship that Jerry Meinwald kindly arranged for me. From that experience, I knew I wanted to build molecules that impact the course of human disease.

That passion eventually brought me here to the University of Illinois to work with a young professor, John Katzenellenbogen, who was blazing a trail that few other chemistry professors were willing to take in the 1980's: marrying chemistry and biology. Dr. K had nurtured a non-traditional environment that blurred the lines between chemistry and biology. He fostered independent thinking that allowed me to grow as a graduate student who wasn't interested in pursuing a traditional path in chemistry. It

was here I realized that pursuing the non-traditional path is not easy, because the mainstream may not be as embracing as you would want. The accolades are not always fast in coming. But it was also here that Dr. K imparted some advice. **“Realize that there will be individuals who will criticize your work no matter what; be confident, don’t be hesitant and know that no one knows more about your work than you.”**

I then had the great fortune to join the lab of Gilbert Stork at Columbia University as a postdoctoral fellow. Gilbert was and still is one of the giants of organic chemistry. His passion for science was infectious, and it was his view that the big problems were only worth pursuing. The big problems are where the real challenges existed, he said. He never missed the opportunity to not attend an important faculty meeting in order to spend time discussing a problem with his students. As he frequently said to me, **“...if it isn’t fun, then it is not worth doing”**. To this day, at 95 Gilbert goes into the lab at Columbia, determined to finish germinine, a big challenge in synthesis. He received many accolades for his work but it wasn’t the accolades that mattered to him, it was the challenge to solve the important problems that drove him.

Each of these individuals, whose lives intersected mine, have somethings in common. They are driven by their passion for making a difference.

They are also humble individuals, never boasting about themselves or their accomplishments, but confident in who they are, and not needing others to validate their worth and the value of their pursuits.

My career then took me to the pharmaceutical industry. What better place to marry chemistry and biology. I was fortunate to have learned the finer details of the craft of drug discovery and development from the best in the field.

There was a point in my career at which I was presented with an opportunity. Was I going to stay in a relatively safe job at a large pharma company doing what I liked, or accept an offer to help start a small biotech company from scratch and maybe blaze a new trail, **even though everyone said it was a mistake**. My first day on the new job, I walked into a building with no labs, no established programs and no staff, and proceeded to say “**what the hell have I gotten myself into**”. But, I drew on all of my past experiences and ultimately built a respectable research and development capability that was able to make some important

contributions to drug discovery. Unfortunately, that wasn't enough for the company to succeed, and eventually the company was sold without accomplishing its ultimate objective. It was an incredibly disappointing outcome for 7 years of very hard work.

I realize today the pharmaceutical industry has its critics and some of the criticisms may be justified, but I will tell you, nowhere are there scientists who are more committed to the mission of solving the big problems in human medicine. As a drug discovery scientist, if you are not passionate and totally committed to trying to solve the big problems, then there is no way that you will survive the many disappointments that come with the pursuit. You see, there is no consolation prize if you don't achieve the goal of finding that therapy that effectively treats a disease. It is in fact rare that an individual will ever be associated with the successful discovery of a drug. Most spend their entire career without ever having that ultimate satisfaction.

Sometimes lightning does strike twice, and after several years another opportunity came my way to again build a research program at another small company and take on another big problem. Now after my first

experience you might say, why tempt fate and disappointment again, a common piece of advice given to me at the time. I would say that it is all about being confident about what you know and the experiences that you have had to guide you. In fact, things turned out very differently this time with the discovery of the breakthrough drug, sofosbuvir. Now it wasn't easy by any means. There were a lot of doubters who never believed the idea behind sofosbuvir would ever work. Today, sofosbuvir has cured over 1 million individuals of chronic hepatitis C infection, including two individuals who I now consider friends. Both were on the verge of death and are now cured and leading normal lives. Being the outlier, carving your own path, and tackling the big problems are worth it.

Many have said to me that I should retire and sit on a beach somewhere and enjoy my successes. **So instead**, I founded a company focused on tackling the next big problem in liver disease, a cure for the 400 million people infected with hepatitis B. Once you foster and grow the tendency of taking the road less traveled, you realize there is no better way to live your life. I believe that if you have the knowledge, experience and ability to make a difference, why not at least keep trying.



Now each of you will write your own story, a story that is uniquely yours. You have already written a chapter or two but you still have a long way to go. You have completed a rigorous course of study in chemistry. Probably the most unpopular and difficult courses of study at any university. Every time I tell someone that I have degrees in chemistry, they get this contorted look on their face. They comment that it was the most difficult course they ever had to take and wonder why anyone would want to deal with that pain. But, for us it captivates our imaginations and curiosity and challenges our intellect. It has taught us how to think through complex problems and to be uncompromising in the search for the true.

I am not here to tell you how to write the rest of your story. I can tell you that you will certainly be surprised by the challenges, opportunities, disappointments and achievements that will come your way. Your academic experiences and the personal challenges that you have endured during your time at this great university have provided you with inner personal strength that will guide you forward when the path is otherwise unclear. You may not appreciate it now, but you will draw on the words and actions of those who have had great influence in your life to guide you. Even when you don't notice it in the moment.

So, take what you have learned here and wherever your journey takes you, whether you continue your career in science or go off into a new direction, don't be afraid to **tackle the big problems**. As the sign on my office desk says, "**leave a trail where there was none**". Believe it or not, you have many of the tools at your disposal, you just need to use them.

So, I will leave you with these words.

- It's not about where you start, it's about where you finish!
- Follow your passion!
- 80% of what you do will fail, so fight for that 20%!
- Don't be afraid to fail, because failure is a great teacher!
- Believe in yourself!
- Have fun at what you are doing!
- Take risks!
- And finally, do something good with your life!

You will be surprised at what you can achieve.

And, **maybe** you will positively impact the lives of others in ways you never could have imagined.

Congratulations Class of 2017 and Good Luck!