

Seeking to understand the rules of life — and taking life lessons from dogs

As an assistant professor of biochemistry and biomedical informatics at Vanderbilt University, Carlos F. Lopez works to develop numerical methods to understand signal transduction cascades in cells and their dysregulation in cancer. He is also the Vanderbilt liaison to Oak Ridge National Laboratory.

Lopez earned his Bachelor of Science in chemistry and biochemistry (double major) and Bachelor of Liberal Arts at the University of Miami and his Ph.D. in physical chemistry at the University of Pennsylvania. He did postdoctoral work at University of Texas at Austin in biophysics and then in systems biology at Harvard Medical School.

In this month's Research Spotlight, Lopez talks about the value of strong mentors and his need for alone time. His answers have been edited for length and clarity.

What key experiences and decisions have enabled you to reach your current position?

Excellent mentorship has shaped my career. I was lucky to find mentors who guided me toward excellence and encouraged me to search for the answers to big questions — mentors who were willing to trust that I could deliver what I promised.

During my graduate work with Michael Klein, I once gave him some slides with incorrect results for a presentation. I found out a week later that I had made a mistake. I was



COURTESY OF CARLOS LOPEZ

Carlos F. Lopez has had many supportive mentors in his life and says, "Your adviser's trust is fundamental to building your own confidence as a scientist."

nervous about talking to my mentor, but he was very matter-of-fact about it and taught me simply to own it, correct it and move on. I learned that it was OK to make mistakes as long as we can correct them.

Support from mentors at the undergraduate, graduate, postdoctoral and even faculty levels has shaped my multidisciplinary interests at the

interface of chemistry, physics and biology in a way that would not have been possible otherwise.

How did you first become interested in science?

I learned to read when I was very young, and I asked many "why" questions. My mother found all kinds of

child-friendly books about science topics, and I devoured them. My father later encouraged my interest in science, and I enjoyed chemistry and physics. However, it was not until I took biochemistry as an undergraduate that I found a connection between the physical and biological sciences. There was a component of luck when I once stayed after organic chemistry class a bit too long and the instructor recommended I explore undergraduate research. I found an undergraduate mentor, Jeff Evanseck, and that experience completely changed my career focus.

Were there times when you failed at something critical to your path? If so, how did you get back on track?

Many times! I think the constant in science is failure.

I worked as a postdoctoral fellow with Peter Rossky studying water-protein interactions at UT-Austin. I thought quantum dynamics sounded cool, and I wanted to pursue this topic. Prof. Rossky explained that this was not a good idea: I did not have a strong foundation in quantum mechanics, and I struggled with some aspects of mathematics. He pointed out that I was talented with statistics and had an understanding of biology that others in my program simply did not have. But I was not good at quantum dynamics. It was a hard conversation. My ego was bruised, but I realized he was correct, and I decided to nourish my talents. After coming to terms

with this failure, I embraced my skills, embraced multidisciplinary research in biology, and never looked back.

What advice would you give to young persons from underrepresented backgrounds who want to pursue a career in science?

Find advisers who believe in you — advisers who understand your talents and where you need to improve. You need advisers with whom you can build a relationship based on trust and who are willing to give you opportunities to learn from failure. They may not tell you what you want to hear, but they will help you grow, focus your work on the areas that excite you and achieve your goals.

I tell my students that a mentor-mentee relationship goes beyond guiding their project. Many emotions are involved in this process, and you need to have a mentor with whom you can express your frustrations and celebrate your achievements. I always joke with Peter Sorger, my postdoc advisor, that we have a mostly loving relationship. He helped me to take a deep breath during the hard times and, most importantly, always showed that he believed in me. Your adviser's trust is fundamental to building your own confidence as a scientist.

What are your hobbies?

Despite enjoying other people's company, I find that I need long periods of solitude to think and process my ideas. Alone time becomes harder

to find as your career evolves, so I try to be mindful about these times. This alone time spurs creativity. My creative process is nurtured by good movies, good music, conversations, walks (preferably with a dog) and playing with my children.

What was the last book you read?

I read two at once. "This Is How You Lose Her" by Junot Diaz is a collection of short stories about relationships among individuals with mixed ethnic and socioeconomic backgrounds. The book's themes revolve around what it means to be human, what it means to be male and the roles we play in society. "A Field Guide to Getting Lost" by Rebecca Solnit reminded me that being lost is how we find ourselves.

Do you have any heroes, heroines, mentors or role models? If so, how have they influenced you?

I do not have a specific hero, but I find qualities in many people that I would like to emulate. I have taken many lessons from my dogs: live the moment, fear can be overcome with love and good company, forgive and forget, enjoy the journey — and cuddling with your loved ones is perhaps the most important thing you can do every day.

What keeps you working hard every day?

The desire to understand how life works! We know that we have DNA, RNA, proteins and so forth; that these make cells; and that cells talk to each other to make organs — and suddenly we have a human being. But how does it all come together? How do we understand this parts list to explain how life works? These questions keep me coming to work and writing grants on a regular basis.

ABOUT THE RESEARCH SPOTLIGHT

The American Society for Biochemistry and Molecular Biology's Research Spotlight highlights distinguished biomolecular and biomedical scientists from diverse backgrounds as a way to inspire up-and-coming scientists to pursue careers in the molecular life sciences. Eligible candidates include Ph.D. students, postdoctoral fellows and new or established faculty and researchers. To nominate someone for this feature, contact education@asbmb.org.