

I work on the wings of robotic bumblebees. Lab work is pretty narrow - you spend weeks to years focused on one specific part of a project. But, ironically, this myopic endeavor has given me perspective on something I think many of us struggle with - our misguided notion that, with hard work alone, we can do anything. We can't. After working in several labs, I've come to realize that a good part of my success, or lack thereof, was not from my own hard work, but from circumstance.

I started off my lab rat days working in crystallography. It's more art than science because there's really no understanding of why stuff crystallizes. The general tactic used by top crystallographers is to throw whatever the hell they can at these molecules - salts, detergents, even pickle juice - and cross their fingers. Seeing a naive intern stumble in, Ramki the resident crystallographer asked me to pipette here, seal a chamber there...and, miraculously, I grew crystals. For the first and last time. Two summers later, I'd gotten great results...of how not to make crystals. All my hard work had paid off with nothing, and I concluded I'd failed. Ramki provided some advice then about keeping our work in perspective. "It's about riding the wave" he said. "Some people jump into a lab when they're hitting a breakthrough, and get results quickly. Others have to get momentum moving, and their projects progress slower." I appreciated his sentiment, but tucked this tidbit of advice away for a rainy day because, around that time, I also had the sudden revelation that crystallography was really not my thing.

I dabbled in other fields for another year or two. Snake venom purification was pretty neat, but there was the constant threat that if I spilled some onto my hand I would become paralyzed. Kinda stressful. Then I tried a cell bio lab. That was cool, besides having to mercilessly pluck hearts out of tiny fish. So, thoroughly disillusioned from working with anything that is, was, or ever could be alive, I joined the RoboBee project. The RoboBee is a flying robot about the size of your pinkie toe that will one day terrorize the nation. But, for now, it has a few bugs, one of which is that its wings used to fall off after 10 minutes of flying. I was assigned to design a better connector for those wings. After some modeling, laser cutting, and lots of watching wings flop around, the data started pouring in. It was all significant. In less than 10 weeks we had a bee that held on to its wings for more than 9 hours. Success.

I was astonished. I wasn't complaining, but...where were the days of slaving away for flabby data? Compared to my earlier research experiences, things had gone off without a hitch. Now, part of that was the nature of the research - robots don't die if you forget to feed them. And part of it was because I worked long hours alongside really brilliant folks. But I believe most of why this project succeeded so quickly, when other projects dragged on, was because our lab had set it up for success. I hadn't spearheaded the RoboBee project or tackled the thousands of obstacles in getting it underway. That momentum, that tiring wave-making process, had started fifteen years earlier. I was just the rookie surfer that, finally, caught a wave.

I lab hopped not because I wasn't getting results, but because I was discovering what kind of research I enjoy. However, lab hopping had the fringe benefit of allowing me to experience firsthand how my timing starting different projects affected their outcomes (or at least the outcomes I was around to witness). I saw a humbling reality that hard work isn't nearly enough, and that luck (or, as some call it, persistence) is needed, too. And it's not just me. I've seen lots of people - labmates, teammates, or just friends - pour their hearts and souls into projects and come up dry. Comparing themselves to neighbors who made the team or published a paper, they feel like they failed. But they didn't. Their success is just, unluckily, taking longer. So the saying "if at first you don't succeed, try try again" doesn't quite capture it all - it's not about just trying, but understanding we're not lesser

people for having to try a few more times, and having faith we can and will succeed. Even if it takes pickle juice.