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My name is Loralyn Cozy and I am in my second year as an assistant professor of biology here at IWU. In talking to you today, I would like to share with you a little about the biology research questions that I and my students try to address in my lab, and then explain that because most of my students will not take the same career path that I have, I have come to recognize some important skills that I think individualized research in the sciences allows my students to develop and take with them no matter their future career decisions and what this means for mentoring at a small liberal arts school like IWU.

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So, let's start here: I grew up in Bellingham, Washington in the Pacific Northwest and went to Western Washington University as an undergraduate biology major. It was there that I got hooked on the fundamental problem that is at the core of developmental biology. Let me explain…

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Multicellular life starts out as a single cell. That single cell contains all of the genetic information needed to make some incredibly complex forms, like this elephant for example. Over time that single cell divides and divides to become the biomass – the quadrillion or so cells that are in that adult elephant on the right. Along the way, each cell becomes specialized such that in the adult an eye cell is different from a heart cell is different from a nerve cell is different from a skin cell. This process is controlled by the elegant coordination of turning ON or OFF thousands of different genes at the right times and the right places over the lifetime of the animal.

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Let's consider origami as a metaphor for the complexity of this process. Every fold of this initially flat piece of paper represents a gene that must be turned on or off in the right place at the right time to ultimately produce a complex three-dimensional structure.

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So a developmental biologist's goal is to understand the sequence of events, essentially the instruction booklet that governs the spatial and temporal regulation of cell type specification. Why did this little spec of paper become the tip of the tail and not the tip of the trunk. For a complex multicellular animal, like an elephant or a human, this is a solvable but very daunting problem to try to answer.

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Why am I harping on elephants? It's because of this quote. Jacques Monod, the Nobel Prize winning molecular biologist famously said, "Anything found to be true of E. coli must also be true of elephants." What he was saying was that a bacterial cell, like this E. coli cell, still operates by the same genetic and molecular mechanisms that a cell in an elephant does. And he was right. So what developmental microbiologists like myself do, is use bacteria as models system for asking developmental biology questions. With the hope that by studying the instruction book for something simple, we can learn things that apply to more complex organisms.

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But I digress. Let me continue on to the idea of mentoring at a small liberal arts institution. Leaving graduate school with my PhD and doing a postdoctoral fellowship, I found myself well prepared to train future academic scholars.

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In essence, I had been trained to make clones of myself. How to make mini-me's who would they themselves go to graduate school and become professors. But I have realized that the critical question of mentorship at a small liberal arts school is necessarily different than at any other type of institution. At IWU, I am not training mini-me's. And that's a good thing. So how do I support my students in pursuing their own unique professional goals using my scientific discipline of developmental microbiology as a backdrop?

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So with three of my research students graduating in the next month, I have been thinking a lot about this. If my students leaving college are like the folks in this picture striking off into the misty mountains, what can I put in their backpacks that will help them no matter what career path they choose? So I would like to end with 3 skills that I hope the students who come through my lab develop.

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In the words of the noted modern philosopher Homer Simpson, “Trying is the first step toward failure” This is true in the lab – the first time you try a new experiment or technique it will fail. Always. Get used to it. Developing a tolerance for initial failure when attempting something new is important for every profession. Not just science. The second thing that, I hope, students learn in the lab follows quite logically from this.

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That is sticktoitiveness. Persistance. Doggedness. However you want to describe it, if you want to emerge from the initial failure we will all experience when challenging ourselves, you must keep at it. In science, this may mean trying an experiment many times, rewriting an abstract, or returning to read the literature again and again in order to understand something more fully. The success that emerges from such persistence I hope leads my students to the final lesson.

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A sense of scale. When you spend an entire academic year working to answer one small question about one particular gene in one particular organism in one particular set of conditions, to make one graph or one picture. It could feel disheartening. But rather than being a let down, I hope my students gain an appreciation for the scale of human knowledge and develop a sense of awe at all of the work that has gone in to constructing it and feel proud that they have added to it with their work.

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Transition