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100th Convocation 2014 Address - Amazing Mice Light Up the Liberal Arts

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CONNECTICUT COLLEGE

Amazing Mice Light Up the Liberal Arts

Address at the 100th Convocation of Connecticut College – August 28, 2014
Marc Zimmer, Jean C. Tempel '65 Professor of Chemistry
and Dean of Studies

Mice are nocturnal. They use their whiskers to find their way around at night. In order to understand how the information travels from their whiskers to their cerebral cortex where it is processed scientists have developed genetically modified mice that express green fluorescent proteins in the neurons that go from the whiskers to the cerebral cortex and nowhere else. Place these brains under a fluorescence microscope and you will see thin glowing brain cells leading from the whiskers to the back of the brain.

I grew up in South Africa and always knew two things.

1. I was going to be a game warden in a South African game reserve. There I was going to look after honey badgers, lions, elephants and dung beetles.
2. Apartheid was immoral and I was not going to join the South African military service, which did nothing but support Apartheid.

Somehow I did not realize that these two central ideas of mine were mutually exclusive and I went to University to study biology to become a game warden in South Africa.

South African universities are very different to liberal arts colleges. They are similar to those universities found in England and Australia. I like to think of them as railway systems. On the first day of university we all came to the main railway station and looked for our trains. With about 450 other students I boarded the Biology train. We all took 1 year of Botany, Zoology, Stats for Biologists and Chem for Biologists. There was no choice. I had a misadventure with botany, which was fortunate in some way as it made me realize that my ambition was on a collision course with my political convictions. I gave up my dreams of being a game ranger and somehow persuaded the registrar to allow me to switch trains after a year and hop onto the chemistry train as it dropped off all the students that had failed in their first year. Molecules excite me and I managed to stay on the chemistry train and was doing a Master's in chemistry when the South African Army came to me and said "Zimmer, you have studied more than enough. The time has come for you to spend the next 2 years of your life defending our morally corrupt system." I rudely avoided them and came to the U.S. where I did a Ph.D. and postdoc in chemistry. Now the closest I come to honey badgers and lions are fluorescent proteins from jellyfish and corals that I study computationally.

I also teach chemistry at CC, a very different educational model to the traditional university system. I like to think of our educational system as an intellectual maze.

New students, you are standing at the entrance of this fantastic maze, a lush and verdant garden maze. It has four levels, each level takes approximately a year to traverse. From the entrance you should be able to see numerous exits. They are all on the fourth level, some like the English, psychology and economics exits are well travelled, but others like the classics/dance double major exit are less commonly used. Although the exits are clearly visible there are no direct or correct paths from the entrance to the exits, you, with help from your adviser, will have to find the route that suits your interests and your talents. It will be a very personal journey of the mind.

The Versailles maze or labyrinth was a fantastic maze. More than 300 years ago it had 39 hydraulic statues representing popular fables coming out of fountains. Unfortunately, Louis 16th had the maze removed in 1778 and we are only left with paintings of the Maze. Not that it would ever have been in the same league as our CC maze. No mere hydraulic statues in our maze. We have Worlds of Food, Big History and Marine Ecology, go to the middle of the second level and you will find one of my favorite aspects of the Conn maze, its Centers. With strange names like CISLA, Holleran, Arts and Tech and the Goodwin Niering Center, they provide you with access to special paths through the maze – international environmentally friendly rollercoasters of the mind that catapult you out of the maze into the world, change you and plop you back in the comfort of Camelland when you are done. Through the GE requirements and with the help of your adviser we hope that you find your optimal path to the exit defined by your major. A path that will expose you to many large swaths of our maze and shows you the relationship between the courses you take. When you get to the exit we don't just want you to understand the route you took to your exit but to have a complete overview of the educational landscape that is the CC maze. So if you ever need the knowledge contained in parts of the maze you never visited, you will know how to most efficiently get to those parts and teach yourself.

At this point some of you may be thinking “I wish I could get on a train and forget about a personalized exploration through a multistory maze, I know my major and this seems like a hassle.” But in the conclusion to my talk I would like to convince you that the CC liberal arts maze is a much better educational model than the railway systems found in Universities.

The latest US census showed that 75% of science majors work in fields that are not related to their fields of study. Also new studies – I love these studies – predict that in 10 years, 5% of the 2014 graduates will be doing jobs that don't currently exist. What a better way to prepare yourself for a job outside your major than a maze approach to learning. Imagine a new area of work that is formed from an intersection computer science, anthropology and economics. With our top down view of the CC educational maze you will be able to find all the relevant classes you took, fill in the gaps and get one of these new currently unimaginable jobs.

I am a science geek and I love a good experiment, especially one with fluorescent proteins. And guess what? There is an experiment that proves the superiority of our maze. This experiment relies on the mice I introduced at the beginning of this talk. Remember the mice with the glowing brain cells between their whiskers and their cerebral cortex? Well, to see what happens in real live mice, scientists have taken a part of the mouse's

skull and replaced it with a glass window. Now they can use a fluorescence microscope to see what is happening to these neurons on the surface of the cerebral cortex in live mice. The modified mice seem to live a normal life with windows into their minds.

Take a mouse and place it in a large cage in which it can move from point A to Point B in a straight line to get its food (the university model) and look at its brain... You will see nothing special. Now take the mouse and place it in a maze (Connecticut College), so it has to use its whiskers to find the food. The neurons on the surface of the cerebral cortex branch out and the dendrites grow many new spines. In a maze the brain becomes more complex - clear undisputable evidence that the CC curricular maze is better for your brain than the Oxbridge university railway system.

So, welcome to the superior CC curricular maze. Come on in and play with a language, dance with anthropology, dissect a religion and paint your way through a science. Make friends, find a mentor, enjoy your mind and seek out new intellectual experiences. Stimulate your neurons so your dendrites dance and the spines sparkle, and most importantly beware of science geeks placing glass windows in your skull, despite what I said, I don't think it's very comfortable. Make the most of your 4 years in the maze. We are all, faculty, students and staff tremendously privileged to be sitting here at the entrance of the amazing maze of learning. So let's make the most of it. And rejoice in being a camel. After all, camels are big grumpy old things and scientists tend not to mess with them.