UC San Diego
UC San Diego News Center

By Kim McDonald Oct 10, 2013

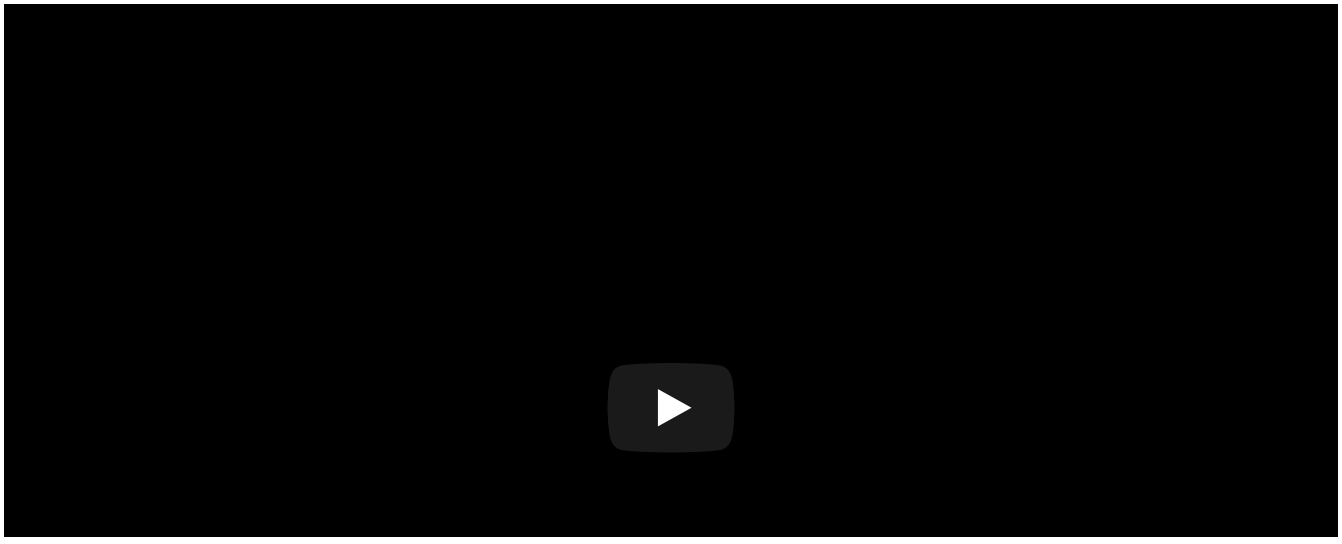
New Dean of Biological Sciences Seeks to Improve Undergraduate Experience

This is the first of a three-part series introducing our new incoming VC and deans.

Biology majors and students taking undergraduate biology courses will see some new changes to improve the undergraduate experience this year, according to William (Bill) McGinnis, who was recently named dean of the Division of Biological Sciences.

Many on campus are already familiar with McGinnis, a distinguished professor of cell and developmental biology who came to UC San Diego from Yale University in 1995 and served as the interim dean of the division during the past year as well as from 2000 to 2001. As a longtime faculty member, the internationally renowned biologist—whose discoveries have shaped our understanding of how genes regulate early embryonic development—had been focused primarily on his research and teaching activities.

But as the new dean, his belief in the importance of educating every undergraduate student about the principles of evolution, the need to make biology education more practical for majors and his passion to open the science pipeline to those in the community who may not have the opportunity to study science will bring about some important changes in the coming year. He describes some of the changes below and in a video interview with UCSD-TV:



What changes can non-majors and majors expect in their biology courses?

We're renovating and building new undergraduate biology labs that will allow more students coming to UC San Diego to experience practical, hands-on science. I think it's an important change because personally doing modern experiments gives students a concrete understanding of the real-world usefulness of the abstract knowledge that they are learning from books. I also want to put more emphasis on educating students about evolution, because it's the basic organizing principle in biology. We should explain to every undergraduate student at UC San Diego the scientific evidence for evolution. So, we're going to put more emphasis on evolution in every biology course, especially those for non-majors. We're going to provide examples of why certain biological systems evolved and more examples of the evolutionary function of different things. If there's one subject that I'd like liberal arts or social science majors to know more about, it's evolutionary biology. Evolution is not a theory; it's a fact. We see it every day. Unless you understand the principles of how living things have changed over time, I don't think you've had a proper undergraduate education.

What changes will biology majors experience in the coming years?

We're going to update the curriculum for our biology majors to better prepare them for the 21st century. Because biology now requires more quantitative understanding, our students will be required to take more probability and statistics courses to learn the skills they'll need to solve the biological problems of the future. We want our students to understand the language of biology, but the language of biology is now becoming more mathematical. So, quantitative biology will be emphasized more in the education of our undergraduates, and UC San Diego is at the frontier in quantitative biological research. The one area that won't change is our encouragement of undergraduate participation in research. Faculty here have had a long tradition of welcoming undergraduates into their laboratories, in part because undergraduates often ask naïve but good questions about research that might never occur to their advisors.

What's the one thing most people don't know about you?

That I grew up in a very small, rural town in Missouri. I consider myself extraordinarily lucky because Warrensburg, Missouri had a great public library where I became addicted to reading books. I tried to read almost everything in that library—history, science, science fiction, and mystery novels. It gave me a window into the rest of the world and showed me that there was so much more out there.

Is that how you got interested in biology?

I was a lackadaisical high school student, but I went to college for a year. The next year, before I was about to be drafted in the Army during the Vietnam War, I enlisted in the Navy. That experience provided a lot of motivation to study hard in the sciences, which had always fascinated me. I also learned in the Navy that if you want to get really good at something you have to spend thousands and thousands of hours doing what you want to master. There are no shortcuts. You have to think hard and you have to practice a lot. So, when I got out of the Navy and went to San Jose State on the GI Bill, I carried that lesson with me. My specific interest in biological sciences was largely due to some professors at San Jose State and at NASA, where I worked in the summers, who sparked my interest in biology and those experiences eventually led me to graduate school at UC Berkeley.

What else did your military and college experience teach you?

That there are a lot of people who have the aptitude for science, but haven't had the chance to pursue it. You have to be self-motivated to go into science, for sure, but that's not enough. You need someone to help you and show you the opportunities. Some of the guys I was on the aircraft carrier with were incredibly intelligent and I know would have had the ability to accomplish fantastic things in art and science. Many of them were as smart as my fellow faculty members at UC San Diego and Yale, but they never realized their potential because they came from environments where no one gave them the opportunity. One of the things I plan to do in the Division of Biological Sciences in the near future is to restart a lecture series where our faculty can communicate what they've learned to the public, particularly students who have an aptitude for science, which may help them connect with our scientists in a personal way, and realize that our faculty are just like them, but with more experience and opportunities.

What got you excited about doing research in biology?

As an undergraduate at San Jose State, I was able to take graduate courses and I took a class from a geneticist who had just come from Princeton University. He had us read not only from textbooks but also from the original scientific papers—the latest discoveries as they were published in *Nature* and *Science.* And in reading about what was occurring in the field of embryonic development, I found out that people were starting to connect particular genes with the development of particular parts of animals—such as the development of heads, wings, tails. That was new and exciting and it got me interested in research. I was also lucky enough to be at the right place at the right time. I got into the Ph.D. program at UC Berkeley during the birth of molecular biology, when we were just learning how to clone DNA and make proteins and, when I later went to the University of Basel in Switzerland to do my postdoctoral research, I was able to apply those new techniques to make discoveries about the genetics of early embryonic development.

Did your undergraduate experience influence how you approach teaching today?

Absolutely. Bob Fowler, the professor at San Jose State who encouraged me as an undergraduate in 1978, just semi-retired, but he's still teaching genetics there in an environment that promotes practical, hands-on learning. I've kept in touch with him and he pooh-poohed the notion that he had a big effect on my life. He said I would have done the same without him. I don't believe it. Bob is one of the hidden heroes in our profession. Like some tough teachers who don't get the highest student approval ratings, he demanded absolute excellence from his students; no jokes, no catering. We should celebrate those who spend their entire careers educating undergrads without getting awards and other kinds of recognition. Bob never sought awards; he just taught with passion, dedication, and with the aim that his students should one day know more that he did.

What's new and exciting in biological sciences research?

There are so many exciting areas I could talk about, but one recent incredible opportunity is our establishment of the Center for Brain Activity Mapping, which is bringing together researchers from the Division of Biological Sciences, Division of Social Sciences, School of Medicine, Jacobs School of Engineering, and San Diego Supercomputer Center to develop new tools to study the function of the brain in a way we've never been able to study before. It's a key part of President Obama's Brain Initiative, a huge nationwide effort to unlock the mysteries of the human brain, which two scientists in our division—Ralph Greenspan and Nick Spitzer—were instrumental in helping the White House develop earlier this year. How do we construct memories? How do changes in our circadian rhythms affect our behavior? How do changes in the way cells signal teach other change to our behavior? These are some of the questions we'll be able to understand in greater detail once we develop the tools that can measure things like functional connections between brain nerve cells. We're also going to strongly support the expansion of the Kavli Institute for Brain and Mind, a center on our campus directed by Nick Spitzer that propelled this Brain Mapping initiative.

What does the public need to know when it comes to research at UC San Diego?

That basic science takes 10, 20 or 30 years to pay off with practical applications. People need to understand that you've got to do the basic research first, because there's no tech transfer without the basic discoveries. You don't cure cancer; you don't find new ways to reduce infections by having physicians think of new solutions. You have to do the basic research to understand how a biological system works. You have to understand how the brain works in order to understand how to attack diseases like Alzheimer's or other neurodegenerative disorders, which are on the increase because of our aging population. The applications from such purely academic research may take decades, but the economic and societal payoffs can be huge. One of our former biology professors, Gordon Sato, did basic research on growth factors here in the 1980s and was involved in the discovery of an antibody that was later found to be a useful anti-cancer drug. The patent from that discovery has since generated about $60 million in revenue for the University of California and the inventors. Another of

our professors, Donald Helinski, did basic research on an enzyme in fireflies called luciferase, which is now used widely in laboratories as biological activity detector. The patent on his discovery has since produced about $24 million in revenue for the University of California.

What makes UC San Diego such an attractive place for biologists?

There's a tremendous wealth of knowledge on the Torrey Pines Mesa and a close collaboration between biotech companies and basic research scientists that's not found in other places. When I came from Yale, I saw that there was a special spirit in San Diego in the way scientists talked to one another that doesn't exist in many other places. The other thing about UC San Diego is that it's not a stodgy, self-satisfied place. We don't brag about being a university that's been around for 300 or 400 years because we haven't been around for all that long. We're not looking at the past and saying how great we've been. We're interested in building the future. And my responsibility now is to build the future for the biological sciences at UC San Diego. That's what's exciting for me personally. We live in an age of explosive growth in the biological sciences where important discoveries are made every day, because we're developing new tools to understand living systems and because there are more and more talented people who are working on biological problems. All of this is going to have a real-world impact here in San Diego and the rest of the world.