

## UC San Diego Graduate Students Take Their Research to State Capitol



To many people, graduate research is a little-known corridor in the halls of higher education. To some it is perceived as a mysterious side nook in the ivory tower, where esoteric research is conducted for obscure ends.

Today (March 14), a delegation of 20 graduate students and deans traveled to Sacramento to give lawmakers a very different perspective: that of graduate student research as central not only to the future of the University of California, but to that of the state and the nation as well.

"All of the research ever brought by UC was enabled by graduate students," UCLA Dean of Graduate Education Robin Garrell said. "They bring the fresh perspective, the hard work, the new ideas. They have an incredible influence on shaping the direction of research.

"Just today," Garrell related, "my department is filing a patent on a device for enabling reactions with very small particles

that was the idea of one of my graduate students."

In a series of face-to-face meetings, graduate students from each UC campus sat down with lawmakers to give them a better sense of the work they do — and why it is of vital importance to California and its residents.

They recounted their work on imaging that can detect very early stage cancer, designing smarter systems for managing infrastructure, maintaining the safety of prescription drugs in the era of Internet pharmacies and looking at how climate change affects animal and plant life in California. They shared research that could expand our understanding of how human languages are structured, how media shapes our worldview and the way we use reading and writing of literature to construct an understanding of ourselves.

Part of the goal of the day, UC organizers said, was to show legislators the direct economic benefit of graduate student research. Graduate students also are a key factor in attracting and retaining top-quality faculty at UC; and eventually will fill faculty ranks at both UC and CSU.

But, as UC Vice President for Research and Graduate Studies Steven Beckwith noted, graduate education serves an even greater function in training individuals with the ability to think, uncover, question and problem-solve. These attributes are critical to today's complex economy and society.

"There's a misperception that all graduate students are being trained to be professors," Beckwith said. In fact, the skills honed by graduate students have the broadest possible applications.

"The problems you will be charged with solving are not problems we are seeing now. They are not problems we know about. They are things we haven't even seen before," Beckwith directed to the students. "What you bring is the capacity to wade into brand new territory equipped with only your curiosity, your intelligence and your ability to solve problems. That is the talent the world will need. And it is talent that, thanks to the strength of our graduate students, UC will be well-poised to provide."

### **Prying open the black box**

"Graduate students' charge is to find questions worth answering," said Kim Barrett, dean of graduate studies at UC San Diego. "And they are often questions directly relevant to real-world problems — problems like earthquakes, energy and addressing the cultural and social issues of the state."

One of those students is UCSF biological chemist Michael Lopez, who is studying the basic workings of cells to understand how they use chemical signals to communicate and receive messages. "The excitement is in looking at this total black box that you think you could never understand, and finding a way to actually understand it, or at least some of it."

The first in his family to go to college, let alone pursue a graduate degree from one of the world's top research universities, Lopez did not start out seeing himself as a career scientist — in fact, far from it. A mediocre student in middle and high school, Lopez joined the Marines after high school. He thought he might become a mechanic after completing active service, until a book on DNA sparked his interest, and he enrolled in Fresno Community College to study chemistry.

He became a dedicated student and ultimately transferred to UC Berkeley before going on to UCSF to pursue his Ph.D. in biological chemistry.

"My ability to do this was completely dependent upon having cheap, publically funded education available to me at every step," Lopez told lawmakers. "In any other state, my story could not have happened."

It is this brilliance, passion and curiosity that enables graduate researchers to slog through the 99-percent-perspiration that is the requisite for breakthrough discovery.

"A lot of research is just about bearing down and plugging forward," said UC Berkeley doctoral student Iris Tien, who is using advanced probability modeling and information mapping to help civil engineers make smarter decisions about managing infrastructure. "There's something that I have a hunch might be the answer, so I keep pushing forward and maybe in six months I'll find it."

Some students' work focused on solving specific problems, such as that of Shelley Rohde, who studies applied mathematics at UC Merced. She is developing a mathematic model physicians can use to interpret light-scatter imaging and detect very early stage cancer.

For other researchers, the goal is more nuanced. "The real quest for me is not finding one answer, but being able to incorporate a whole diversity of experiences and possibilities, and to help my students to think critically in a way that encompasses those broad perspectives as well," said UC Santa Barbara student Lindsay Palmer, a former broadcast journalist who now is studying the way media shapes and perpetuates certain preconceived notions.

## **Troubling trends**

Graduate students occupy a unique place in higher education, progressing from scholars of what's already learned to become creators of new knowledge themselves. "They are getting deep training in a discipline at the same time that they're pushing forward the boundaries of knowledge about that discipline," said Andrew Szeri, UC Berkeley graduate division dean. "They come up with ways to combine things and approach things. They stretch you in ways you couldn't even imagine."

They are also a key part of what attracts and keeps UC's world-class faculty. A survey recently done at Berkeley found that the ability to attract high-quality graduate students outranked every other factor in recruiting and retaining faculty, including pay.

But leaders in graduate education see troubling trends. While the number of graduate students in the country has grown, the federal and state research dollars to fund their research has stayed flat, meaning there is less funding available per researcher. Dwindling state funds threaten to reduce the number of teaching assistant positions graduate students rely on to fund their studies.



As the funds to cover graduate studies become more pinched, the cost of the tuition they need to cover is rising. It's a double whammy that university leaders say threatens to erode the strength of UC's top-rated graduate enterprise.

### **Spreading the 'wow factor'**

Giving lawmakers the chance to meet with graduate students gives them a whole new perspective on the importance of their role, said UC legislative advocate Kate Daby-Horpedahl.

"I greatly appreciate hearing directly from the students who are currently immersed in graduate work," said state Sen. Jean Fuller (R-Bakersfield), whose staffers met with the UC Merced delegation. "It is only through these first-hand accounts that legislators and their staffs can be reminded of the importance of these programs and what their continued investment means to the state."

In a meeting with a delegation from UCLA, State Sen. Ed Hernandez (D-West Covina), chair of the Senate Health Committee, echoed Fuller's admiration for the work the students were doing. But while affirming his support for UC, Hernandez conceded, "My hands are tied." If ballot initiatives to raise tax revenue — intended to help fund public higher education — don't pass, "I won't like taking those votes [to cut funds], but we have to. The solvency of the state is paramount."

Participants said the goal of the day was met in giving lawmakers a broader sense of graduate students and what they bring to the table.

"I'd like them to understand the really exceptional base that we have here in California in our UC graduate students," said UCLA's Dean Garrell. "They are already the knowledge producers, inventors and creators — and we expect even greater things to come."

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