In FOCUS

ACS chemical biology

Balancing Teaching and Research in Obtaining a Faculty Position at a Predominantly Undergraduate Institution

Deborah C. Tahmassebi[†,*] and James R. Williamson[‡,*]

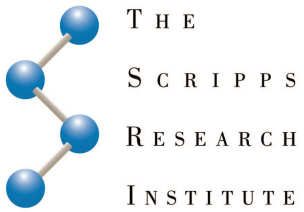
[†]Department of Chemistry and Biochemistry, University of San Diego, 5998 Alcala Park, San Diego, California 92110, and [‡]Departments of Molecular Biology and Chemistry and The Skaggs Institute for Chemical Biology, The Scripps Research Institute, 10550 North Torrey Pines Road, La Jolla, California 92037

Securing a faculty position at a predominantly undergraduate institution (PUI) is a challenging career goal. As a graduate student and postdoc at a major research university, it can be difficult to obtain the experience needed to be a competitive candidate. The primary challenge is often obtaining experience in real classroom teaching, which is important for a position in which such teaching is a primary focus. Faculty members at many PUIs are expected to carry out novel, externally funded independent research with undergraduate students, while teaching two or more classes per semester. However, there is a nationwide dearth of programs that specifically provide the appropriate experiences tailor-made for PUI faculty positions.

The reasons for the lack of specific focus on training PUI faculty members are complex yet rather clear. PUIs set high teaching and research expectations for prospective faculty members, who are drawn from the ranks of postdocs at top-ranked institutions. Yet they do so in full knowledge that such postdocs are successful products of a research machine, where training is funded by competitive research grants to the principal investigator (PI) of the laboratory. Here, inherent conflicts of interest exist. Most PIs expect their postdocs to devote their full time to research and take a dim view of a postdoc devoting a significant effort to teaching classes. On the other hand, PUIs expect both strong research and teaching of their faculty members. How is it possible to be prepared to do both and do both well?

Clearly, the ranks of PUI faculty are filled every year with candidates who have managed to obtain the necessary teaching and research credentials. The Council on Undergraduate Research (www.cur.org) offers an excellent summary and overview on obtaining a PUI faculty position (*1*). However, it seems that it is in the best interest of both the PUIs and the major research universities to provide a specific career track for this important demographic. The PUIs have an interest in having top-notch faculty. Research institutions and universities thrive on the outstanding students who emerge from the PUIs into their graduate programs. There seems to be a lack of recognition of this strong connection and a lack of resources to address the apparent disconnect between supply and demand for PUI faculty members.

We have taken a small step toward addressing this problem by taking advantage of the proximity of our respective institutions and our complementary strengths. The Scripps Research Institute (TSRI) is a world-class research institution known for its interdisciplinary approaches to basic research in chemical and biological sciences. The University of San Diego (USD) is known for



Permission courtesy of The Scripps Research Institute

***Corresponding author, jrwill@scripps.edu, debbiet@sandiego.edu.**

Published online August 17, 2007

10.1021/cb700155d CCC: $37.00

The JUST Program will provide a mechanism for postdocs to obtain undergraduate teaching experience that is not currently available at TSRI.

Box 1. TSRI Kellogg School of Science and Technology

In 1989, TSRI established an innovative doctoral program unlike any other in the U.S. Combining its unique strength in the integration of such disciplines as cell and molecular biology, structure, and chemistry, it developed an interdisciplinary Graduate Program in Macromolecular and Cellular Structure and Chemistry, and in an effort to draw upon the superior capabilities of a newly assembled chemistry faculty with an outstanding record of achievement in contemporary areas of chemical, biological, and structural research, a doctoral program in chemistry was established three years later. In honor of their extraordinary contributions to science and education, in 2002 TSRI named its graduate college the Kellogg School of Science and Technology for philanthropists Janet R. ("Jean") Kellogg and W. Keith Kellogg II. Because most of the important problems in biology and chemistry today require an interdisciplinary approach to their solutions, the graduate programs in chemistry and biology take advantage of several disciplines. These programs draw on the expertise of TSRI's faculty in all areas of science, including structure, molecular and cell biology, immunology, the neurosciences, organic and bioorganic chemistry, and biology. These five-year programs lead to a Ph.D. and provide training for a select group of outstanding and intellectually diverse students. Since the establishment of the Ph.D. graduate program in 1989, 251 students have graduated, and 232 students are currently enrolled.

its excellent teaching and strong record of undergraduate research. TSRI does not have undergraduate students, and USD does not have a graduate or postdoctoral program in chemical and biological sciences. We have formed the Joint USD–Scripps Training (JUST) program as a mechanism by which postdoctoral fellows at TSRI can receive experience in mentored classroom teaching and working with undergraduate research students at USD.

JUST for Future Faculty Members. The goal of the JUST program is to provide TSRI postdoctoral fellows with a mentored teaching experience at a PUI in order to best prepare them for an academic career that involves both research and teaching. The postdocs will conduct their research at TSRI and their teaching at USD, and they have the opportunity to participate in collaborative research projects with faculty from USD and TSRI. In addition, JUST fellows will develop their own undergraduate research programs, while working with USD undergraduate students to fully develop their ideas and perform preliminary experiments. As they plan for their careers in science, USD undergraduates will be exposed to the world of graduate science, encouraged to continue in the field and to identify their areas of interest. JUST fellows will have singular opportunities to develop both independent teaching and research programs prior to their first faculty position.

The JUST program was recently funded by the Fletcher Jones Foundation to support two JUST fellows with two-year fellowships. The foundation is located in Los Angeles and has supported the higher-education goals of private colleges and universities in California for >30 years. The funding from the Fletcher Jones Foundation will completely support the JUST fellows' postdoctoral stipend, benefits, and research supplies. Funding is also available to pay stipends and to cover supplies for the undergraduate students who will work with the JUST fellows. Along with receiving excellent research and teaching experiences, the JUST fellows will be assisted in developing independent research programs and preparing to apply for tenure-track faculty positions.

The fellowship is open to senior-level graduate students at the Kellogg School of Science and Technology (see Box 1) and TSRI postdoctoral fellows who are in the first two years of their position. Kellogg students will receive guidance to identify a suitable postdoctoral adviser at TSRI. Given the large number of PIs at TSRI, it will not be difficult to find a group that will be open to the diverse experience required for success as a JUST fellow. Current TSRI postdocs can apply only if they have research mentors who would be supportive of the schedule and varied expectations of a JUST fellow. Full funding of the fellowship will provide a higher level of autonomy for the JUST fellow compared with that of a typical postdoc.

We believe the program will bring a host of benefits to both the PUI and the research institution. The JUST program offers enhanced opportunities for undergraduate students to learn more about graduate school and about being a graduate student from postdocs who are closer to their age and experience levels. We anticipate that this may encourage undergraduates to pursue graduate school and careers in research. In addition, increased opportunities for research collaboration will be available to faculty. Several USD Chemistry and Biochemistry faculty have completed sabbaticals at TSRI and continue to be in contact with researchers. The JUST Program will provide a mechanism for postdocs to obtain undergraduate teaching experience that is not currently available at TSRI. Several outstanding applicants for the TSRI graduate program have expressed interest in careers in teaching and research at a PUI. We believe that the JUST fellows program will help recruit these students to our graduate program.

The specific courses taught by the fellows will depend on their individual backgrounds and department needs. However, we anticipate that they will have the opportunity to teach classes offered at all levels, including introductory laboratory courses, such as freshman general chemistry, and

upper-division team-taught courses, such as biochemistry laboratory and physical organic chemistry.

Origins of the JUST Program. The idea for this program emerged from a chance meeting between the two authors of this article. While on sabbatical from her faculty position at USD during the academic year 2006–2007, Deborah Tahmassebi worked in the laboratory of David Millar at TSRI. During casual conversations with Jamie Williamson, the associate dean of graduate studies of the Kellogg School of Science and Technology at TSRI, the rich opportunity for synergy in teaching and research between a local PUI and a research institution became apparent.

Over the past five years, the Department of Chemistry and Biochemistry at USD (see Box 2) has worked diligently to increase the level of student and faculty scholarship while continuing its commitment to excellence in undergraduate education. With generous support from the Research Corp. (Tucson, AZ), faculty members traveled in teams of three or four to departments with strong records of exceptional research and teaching at the undergraduate level to discuss and develop a vision and plan for the future. From the lessons learned from those visits, a strategy emerged in which teaching and research are skillfully blended through the introduction into the curriculum of more research-based experiences. Examples include a research requirement for all majors and the introduction of research-based experiments into the upper-division laboratories. To be successful, faculty members have to be very creative to make sure that the experiences have exceptional educational value for the students and productive outcomes for individual research programs. Faculty members in these representative departments have excellent success obtaining external funding in support of their research programs.

By and large, the faculty members who have been hired at PUIs would also be competitive applicants at a research university; however, they are often interested in and dedicated to a greater emphasis on teaching in their careers. To be a competitive candidate in a PUI faculty search, one must complete a postdoc at a top-notch institution and, preferably, have some teaching experience. It is worth mentioning that more emphasis is placed on research rather than teaching, even at a PUI. Although getting hired at a PUI is possible without any teaching experience, it is virtually impossible without a postdoc and a viable research plan (amenable to undergraduate research) that has a strong chance of funding success. The most competitive candidates are those who have excellent postdoctoral research experiences and have also managed to gain teaching experience.

A Sigma Xi postdoc survey funded by the Alfred P. Sloan Foundation was conducted between December 2003 and April 2005 (*2*). Information was gathered from 7600 postdocs at 46 institutions, including TSRI. The survey indicated that 37% of postdocs received no proposal-writing training, 64% did not have any training to develop teaching skills, and 50% did not have any training in group management. The postdocs also responded that they received good/

Box 2. USD Department of Chemistry and Biochemistry

USD is a medium-sized Catholic liberal arts institution that focuses on undergraduates and offers B.A. degrees, and no graduate degrees, in chemistry and biochemistry. Formed by the merger of two schools in 1972, USD has experienced rapid growth, substantial enhancements to its physical plant, and dramatic increases in quality. The sciences at USD have shown tremendous growth over the past 10 years. In this period, the number of science majors has doubled, and >60% of these students are female. The Department of Chemistry and Biochemistry at USD has come a long way in a relatively short period of time. Since the time of the merger of the College for Men and the College for Women in 1972, the growth in our department has mirrored the growth of the university. At that time, we had very modest facilities, far fewer faculty and students, and limited ongoing professional activities. For example, in 1976, we had only five full-time faculty members and 18 students majoring in chemistry. Currently, we have close to 100 majors and 11 tenure-track faculty members. In June 2003, we moved into the Donald P. Shiley Center for Science and Technology, a 150,000 ft^2 facility containing 73 state-of-the-art laboratories and support facilities for biology, chemistry and biochemistry, physics, and marine science and environmental studies. In a nutshell, this new $47 million facility has removed a barrier to our success (in terms of limited and dilapidated spaces) and has enabled us to practice our science and fulfill our teaching mission at even higher levels than in previous years. However, one feature has intentionally not been changed: our commitment to students and to student learning. Our aspiration then and now is to offer the highest-quality teaching and learning environment for our students. As USD moves forward with several initiatives to strengthen the academic climate on campus, we in the Department of Chemistry and Biochemistry see ourselves at the forefront of this process. We recently partnered with TSRI for the JUST program. We were awarded a Clare Boothe Luce (CBL) Professorship to start in the fall of 2009. As we establish ourselves as a more research-accomplished department, the presence of a CBL Professor will be a highlight and beacon to our outstanding female students to continue pursuing science and research, as will the JUST fellows program.

excellent preparation in their research skills (84%). Those statistics certainly reflect the fact that a large proportion of the postdocs will be searching for jobs in industry and at research-intensive universities. However, 36% of this group of postdocs indicated that they are seeking a job at a PUI, but only 27% responded that they received good/excellent career training in teaching skills. What is not well understood by this group is how to attain the excellence in both teaching and research expected in the top-notch departments at PUIs.

Other PUI Faculty Programs. We are certainly not the first to address the issue of specific preparation for a PUI faculty position. Several models for science postdoctoral experiences combine opportunities for teaching in research. These programs are funded by universities, the National Institutes of Health (NIH), and various foundations. Some models have been more successful than others. The Camille and Henry Dreyfus Foundation had an early program that was designed to prepare young scientists for careers at PUIs; however, it was discontinued when findings verified that the postdoctoral fellows rarely sought or were successful at obtaining faculty positions at PUIs. Many of the Dreyfus fellows ended up in teaching-only positions or dropped out of academia entirely. The main reason cited was that the focus during the fellowship was primarily on teaching and that not much effort was focused on research (*3*).

Currently, the NIH Institutional Research and Academic Career Development Award (IRACDA) funds programs that link postdoctoral students at research-intensive universities with teaching opportunities at minority-serving institutions (MSIs) (http://grants1.nih.gov/grants/guide/pa-files/PAR-98-085.html). The University of California, San Diego, School of Medicine has linked with the Department of Cell and Molecular Biology at San Diego State University, an MSI, to provide postdocs the opportunity to teach three lectures per semester with the help of a mentor (http://pharmacology.ucsd.edu/IRACDa/iracda/index.html). At another site with an IRACDA program, postdocs complete two years of research followed by one year of teaching.

One program offers several unique features. The Fellowships in Research and Science Teaching (FIRST) program, at five Georgia institutions, has been very successful (www.physiology.emory.edu/FIRST). Even though the FIRST postdocs spend ~25% of their time teaching outside of the laboratory, they have the same number of first-author publications as research-only postdocs at those institutions. Most of the FIRST postdocs have been successful at obtaining faculty positions at PUIs, which was their primary objective.

Conclusions. We believe the JUST Program is unique and innovative for several reasons. The program will link a world-renowned research institute with an undergraduate department known for excellent teaching and research. Most important, in addition to the emphasis on blending research and teaching, the focus is on preparing the research proposals, teaching statements, and other materials that are essential to the postdoc in mounting a successful bid for a tenure-track faculty position. Although the goal of the program is to prepare postdocs for careers at PUIs, we expect that a JUST fellow would also be an extremely competitive candidate for a position at more research-intensive universities. Compared with their colleagues, they will have a better sense of the time demands that teaching poses, and they will already have experience developing course materials. This will allow them to spend more time focused on starting a research program in their first few years, while removing the anxiety of a first-time teaching experience.

Note Added After Print Publication. Because of a production error, Deborah C. Tahmassebi's e-mail was listed incorrectly in the version posted on the web August 17, 2007. The electronic version was corrected and reposted to the web on August 31, 2007. An Addition and Correction appears in the September 21, 2007 issue (Vol. 2, No. 9).

REFERENCES

1. Bushey, M. N., Lycan, D. E., and Videtich, P. E. (2001) *How to Get a Tenure-Track Position at a Predominantly Undergraduate Institution*, Council on Undergraduate Research, Washington, DC.
2. Davis, G. (2005) Doctors without orders, *Am. Sci. 93*, Supplement.
3. Guinnee, M. (2006) Postdoctoral teaching: savvy career move or distraction from research? *Sci. Careers* [Online] 12 May. http://sciencecareers.sciencemag.org/career_development/previous_issues/articles/2006_05_12/postdoctoral_teaching_savvy_career_move_or_distraction_from_research (accessed Aug 8, 2007).