

PRESIDENTIAL ADDRESS

Science in South Dakota: Two Steps Forward and One Step Back

Address to the South Dakota Academy of Science
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Presented by Miles Koppang
Department of Chemistry
University of South Dakota

When I first informed my colleagues of the title for my Presidential Address, they jokingly said, "Don't you have the title reversed?" I told them that my original title was actually, "Science in South Dakota: One Step Forward and Two Steps Back." I am confident that many of you often feel that such a phrase describes the advancement of science in South Dakota. Upon further reflection and after discussions with my colleague across "the aisle," I decided to change my title.

In recent weeks, our problems in South Dakota seem somewhat trivial and self centered given the ongoing war in Iraq. Many people in this room have family members, relatives, and/or friends presently serving in the armed forces who are in or will soon be in Harms Way. Numerous students from our home institutions who are members of the National Guard have been deployed to the Middle East. Are thoughts and prayers are with our troops and their family members in this tumultuous period. Also, our thoughts and prayers are with the Iraqi citizens who deal first hand with the war and still worry that they might be abandoned and face a tyrant's rage as was the case in the first war with Saddam Hussein.

Almost one year ago to this date, we gathered for our annual meeting in Sioux Falls on the Augustana College campus to hear Steve McDowell, Professor of Chemistry at South Dakota School of Mines and Technology, present the annual Presidential Address to the Academy. I trust all of you know Steve passed away unexpectedly on Friday, March 7, 2003. Steve McDowell joined the Chemistry Department at School of Mines in 1990. He received his BS degree from Miami University and his Ph.D. from Iowa State in 1983. He was a Post Doctoral Associate at the University of California Riverside and was a member of the Chemistry Departments at California State University and Santa Monica College before moving to Rapid City. He served as Chair of the Department of Chemistry and Chemical Engineering from 1998 - 2002. He also chaired the faculty senate at School of Mines. Last year in his Presidential Address, Steve talked about Science and Change in South Dakota and about his research interests in the inorganic vitamins; the Cobalamins. The admiration, respect and relationships that Steve enjoyed with his colleagues, students and former students are reflected in the comments that people posted at the De-

partment's Web page I first met Steve at one of the earlier SD EPSCoR meetings. Through EPSCoR and South Dakota Academy of Science meetings, many of you had the opportunity to meet and interact with Steve. He will be missed and are thoughts are with his family, close friends and colleagues, many of whom are here in the audience. It seems that our problems in moving science forward in South Dakota seems rather unimportant with respect to losing a friend and colleague like Steve McDowell and with the war raging in Iraq.

I would like to use this time to review the changes in science in South Dakota that I have experienced since arriving at the University of South Dakota. I know that my comments are heavily influenced by my experiences with public higher education in South Dakota and I apologize if those from private institutions and other scientific entities here feel somewhat removed from my experiences.

First, I would like to tell you a little about myself. I was born and raised in the upper Midwest growing up on a farm in northwestern Minnesota. My father told us that we needed an education because the farm was too small for any of us to operate. Although farm life provides a wonderful setting for developing an interest in science, I was much more interested in sports and would have preferred growing up in town so that I could play ball more frequently. However, my love of baseball was definitely nurtured on the farm. While sitting in the truck during grain harvest, I would listen to the Minnesota Twins and have followed their progress religiously since the fall of 1965. It wasn't until my final year in high school that my interest in science was kindled. I took chemistry from an "ex-hippie" my senior year. When he was going through the elements of the Periodic Table, he came to radon and proceeded to fall into song, "a radon love", (which I am not going to sing) a tune made popular at the time by the group Golden Earring. I received my bachelors majoring in chemistry and math from Mayville State College and earned my Ph.D. in Analytical Chemistry from the University of North Dakota. My research was in organic electrochemistry and we studied reductive cleavage of ethers. After postdoctoral work at Kansas University in Bioanalytical, I accepted a faculty position in the Chemistry Department at the University of South Dakota in September 1986 and am now in my seventeenth year at USD.

In the summer of 1988, I was asked to contribute a research component to the NSF EPSCoR proposal. EPSCoR, for those who might be unfamiliar with the acronym, stands for Experimental Program to Stimulate Competitive Research, a program designed to make those states that were typically unsuccessful in obtaining federal research dollars, more competitive in securing federal grants and contracts. This proposal was actually the third round or attempt for South Dakota, having "failed" in two previous attempts to participate in EPSCoR. I say fail, not because the proposed science or the quality of investigator was lacking, but the EPSCoR program required a commitment by states to change the way or manner in which basic research was supported. In the first two submissions, the state did not demonstrate a sufficient commitment or level of support for the participating investigators. By the late 80's, the level of commitment by the state and industry had changed and South Dakota's proposal was funded. The first proposal was limited to participants from USD, SD-

SU and SDSM&T, and the National Science Foundation was the initial federal agency to have such a program. Today the South Dakota EPSCoR program includes EROS Lab and has involved students and faculty from the other public and private Higher Ed institutions through collaborative arrangements. EPSCoR or EPSCoR-like programs have been created in other federal agencies including DOD, EPA and the NIH. I would like to present some data that comes from the South Dakota EPSCoR UPDATE, the newsletter of SD EPSCoR.¹ Since 1989 when the first proposal was funded, total grants and contracts awarded to the state have increased almost 5-fold. Some recent highlights include:

- 1) South Dakota was successful in receiving funding from the United States Department of Agriculture EPSCoR,
- 2) NSF awarded South Dakota an EPSCoR grant in the amount of \$13.5 million for FY01 to FY04,
- 3) The National Institutes of Health Center for Biomedical Research Excellence (COBRE) was awarded to the USD Medical School in the amount of \$8 million over 5 years to establish a center for neuroscience research and a second COBRE grant for 9.5 million for 5 years for the cardiovascular research center and
- 4) The Basic Biomedical Sciences faculty at USD were awarded a \$6 million BRIN grant for three years in the area of cellular growth and development of bioinformatics.

When I first arrived at USD, only one medical school faculty member had continuous NIH funding. That has changed dramatically today, due in large part, to the science infrastructure development made possible largely through the EPSCoR program. Also, in FY02, for the first time in its history, South Dakota had 100 active NSF grants.

We have greatly increased research opportunities for students as well as opportunities to present their results. My own undergraduate research students were able to attend the following meetings to present their results this past year:

- 1) The ACS Midwest Regional Meeting at Kansas University
- 2) NCUR at the University of Utah
- 3) Pierre Poster Session
- 4) The National ACS Meeting in New Orleans
- 5) Posters on the Hill sponsored by CUR in Washington DC.

I doubt that anyone in this room would dispute the contention that South Dakota Science is much more visible at the national level today than in 1986.

With all of these positive changes, why do I say that with every two steps forward we take one step back? In 1988, two instrument grants were submitted by USD Chemistry to NSF. The first, a proposal for a medium field NMR spectrometer, was funded but required local matching funds. The second grant requested a Gas Chromatograph-Mass Spectrometer through the NSF ILI program. Instead of finding the matching funds locally, the Governor's Office provided the matching monies through the newly established Future Fund. The

Future Fund, using unspent workman's compensation, was established by the late Governor Mickelson to build the intellectual capacity of the state for economic development. Furthermore, the matching requirements for the EPSCoR proposal were provided through the Future Fund. When Bill Janklow was elected Governor in 1996 for his third term, the use of Future Funds as matching funds for instrumentation grants was discontinued. I would like to point out that the statue on the USD campus honoring William "Doc" Farber, Professor Emeritus, was paid with funds (\$60,000) from the Future Fund. This valuable source of matching funds is no longer...two steps forward, one step back.

In the early 90's the public institutions were encouraged to increase enrollment to their capacity. Since funding is enrollment driven, this resulted in significant increases in funding for the public institutions. Record or near record enrollments were seen at the institutions. Students were coming from out of state and with them, their tuition dollars and their disposable income which was being spent in South Dakota. Approximately six years ago, the Board of Regents adopted various policy changes for the institutions including the 7/10 rule, increased tuition for out of state students, reinvestment priorities and a funding framework in which 5 % of the budget dollars were withheld and distributed to the institutions based on regental goals and whether or not the institutions achieved those goals. One goal required increasing the number of majors in disciplines considered to be of critical importance with respect to economic development. Initially, chemistry at USD was targeted as a department that needed to grow. Despite a rather robust enrollment of ~ 70 majors and an average of graduating 15 majors per year (slightly below the number of majors at Iowa State and University of Iowa and larger than numbers at University of Nebraska), we were expected to increase majors by 5 to 10 % annually over a 5 year period in order for the University to recoup a portion of the 5 % of their budget that was withheld. The 7/10 rule was especially problematic. While it was implemented to discourage the practice of offering classes to small numbers of students because of inefficiencies, the rule created chaos. This rule effectively eliminated the departments at the USD Medical School and was the driving force behind the naming of the Division of Basic Biomedical Sciences and its subdivisions of research areas. (This seems to have been one of the few outcomes that has been positive).

Remember last year's (2001-2002) legislative session. The Governor proposed a scholarship program for South Dakota students. South Dakota was the only state in the nation without a state sponsored scholarship or financial aid program for its higher education students. The problem with the proposal was exclusion of the private institutions from the program. Obviously, those institutions voiced strong opposition and the proposal was modified to include private as well as public institutions. These modifications caused the Governor to veto his own bill. A scholarship bill was passed this session without funding but does include private and public institutions.

The creation of the discipline councils by the Board of Regents was to provide a means of better communication within disciplines throughout the regental system. Unfortunately, the discipline councils have been spent a large

amount of time and effort on a common course numbering system which implies that all institutions, despite clear and distinctive missions, are the same. Ironically, as the cookie-cutter stadiums become obsolete throughout the country, a cookie cutter approach to higher education is embraced within the state.

I must applaud and salute our former governor for his efforts to make the mobile science lab a reality. The first lab is outfitted with instruments and curriculum has been developed. It has been on the road this past month visiting schools as test sites to work out the all the bugs and will be fully operational this upcoming fall. Please visit the web site for the mobile lab and/or attend my presentation this afternoon on outreach initiatives.

What about the South Dakota Academy? Have we been able to make any progress? Our current mission statement calls for the South Dakota Academy of Science to:

- develop interest in science
- strengthen the bonds of fellowship between scientists,
- preserve information of scientific value and
- stimulate research in areas that relate to the natural resources of the state.

First, are we developing interest in science? Unfortunately, the Junior Academy, very active and vibrant when I first started attending academy meetings, is no longer active. Instead, the Academy encourages precollege students to participate in regional and the South Dakota State science fairs and the South Dakota Science Olympiad. Academy members play critical roles as judges of the fairs and the Academy is supporting regional fairs and encouraging participants through the sponsorship of modest prizes. The South Dakota Academy co-sponsors along with South Dakota EPSCoR the Pierre Poster session for undergraduate research students.

Second, are we strengthening the bonds of fellowship between scientists? With all of the discipline specific and sub-discipline specific meetings, it is becoming increasingly difficult to encourage colleagues to support the Academy. Institutions such as USD are sponsoring their own meetings for student presentations. At USD these include our Ideafest for undergraduate presentations and our Graduate Science Research Forum. Personally, despite their logistic nightmares, I have truly enjoyed our joint meetings with academies of other states. In the late 80's the SD and ND Academies had a joint meeting in Bismarck. In the late 90's, MN, SD and ND Academies met for a tri state meeting in Moorhead. Professionally, both meetings were especially beneficially for me as the joint meetings provided a critical mass of scientists with similar research interests. The tri-state meeting included an outstanding symposium on electrochemistry. Our meeting next year will hopefully be well attended as we plan on meeting in Chamberlain on Friday and Saturday, April 2 and 3. The focus of the meeting will be the Missouri River and the 200th anniversary of the Lewis and Clark expedition and I encourage all to mark the meeting on your calendars. I can say that the Academy does a great job in strengthening the bonds of fellowship, provided that we can convince more of our colleagues to attend the meetings.

The Proceedings serves as our tool to achieve the third component, preser-

vation of information of scientific value. The hard work of our Proceedings Editor and their support personnel is critical in this area and is too frequently underappreciated. In the fourth area, to stimulate research in areas that relate to the natural resources of the state, the 2004 Meeting in Chamberlain will play an important role in achieving this fourth component or goal. I can personally say participation in the Academy has been worthwhile, helpful and rewarding. Solving today's scientific problems requires crossing discipline boundaries. Participation in the Academy is worth your time and effort and what better setting exists to discuss science with your colleagues from other disciplines than through the academy's annual meeting.

Have we made progress in the past 17 years? My answer is yes but continued progress or two steps forward will likely be accompanied by one step backward. Maybe in the coming years we can change the backward steps from one to one half.

¹ From the South Dakota EPSCoR 2003 Newsletters which can be found at <http://www.sdepscor.org/newsletter.htm>