

Promoting Mentoring Among and For Women in Chemistry: The Experiences of COACH

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A growing body of research documents numerous factors that contribute to women's under-representation in the top tiers of technical and scientific fields. This literature describes the ways in which biases against women, particularly those that are more subtle and implicit, can translate into lower salaries, slower rates of promotion, and less recognition through honors and awards for women relative to their male colleagues (Committee on Science, 2007; Greene, et al, 2010b; Valian, 1999). In 1999 a small group of senior women chemistry faculty from around the United States began meeting to discuss their concerns that women in their field were not experiencing the same career opportunities and advancement patterns as ~~their male colleagues~~ <sup>women</sup>. With seed funding from the Camille and Henry Dreyfus Foundation, they formed an organization called COACH, the Committee for the Advancement of Women Chemists.

Over the last decade COACH has sponsored numerous career-oriented workshops for women chemists as well as workshops for department heads. One aspect of this work is encouraging mentorship relationships for and by women, an area recognized by the COACH founders as important for career advancement. This paper uses data gathered by COACH to examine women chemists' mentorship experiences and then discusses ways that COACH has promoted mentoring and the apparent results of these efforts. We end with a brief discussion of future research that needs to be done in this area and lessons for policy and action.

### The Mentorship Process

Before attending COACH sponsored workshops, the women completed surveys that included questions about their mentorship experiences. In addition, a sub-sample participated in in-depth interviews, lasting up to one hour, regarding their careers. For this paper, we examined data from 255 surveys and 47 interviews. The data were gathered over a span of several years and represent women chemists at various stages of their careers. Thus, they provide information of a broad cross-section of women in the field. The sections below examine who their mentors were and the type of help they received, how mentorship roles sometimes changed over the course of a career, women's experiences with formal mentorship programs, views about why mentoring does not happen more often, and examples of individuals and departments that have had successful mentoring experiences.

### Who Mentors?

Slightly more than a third of the women (38%) reported having a mentor <sup>having</sup> during their education and professional training, and somewhat more (44%) reported ~~that they had~~ a mentor during the first 10 years of their career. As would be expected, mentors almost always held positions that were more senior than the women and had more experience in the field. (Exceptions were those who reported help from a spouse or graduate student <sup>and</sup> or post-doctoral <sup>and</sup> colleagues who were just a few years senior.) A large proportion of the women who had mentors mentioned the influence of their teachers – from middle-school teachers who interested them in science to undergraduate instructors, to those with whom they worked in graduate and post-doctoral programs.

When I was in high school, I think my high school teacher was really, really good...he was an inspiration and that was the most important role that he played.

My high school chemistry teacher was very supportive and he really wanted me to get my degree in chemistry. He was very encouraging....I still correspond with him...At [undergraduate school] there was a woman faculty member ... [who] took a liking to me and she was very encouraging...The other faculty ...were [also] incredibly wonderful and mentoring.

My undergraduate research advisor was very, very encouraging...My post-doc advisors were good. My PhD advisor and I would talk about all sorts of things, career-related.

Senior colleagues sometimes <sup>also mentoring</sup> assumed this role as well. Several women mentioned their department chairs and, occasionally, division deans as providing support and advice. Senior colleagues mentioned were often chemists, but mentorships also crossed disciplines. In general, respondents indicated that the people who were most likely to provide help were those who were most comfortable in their own careers. As one person put it,

I have found that people who are very senior and very accomplished, who are basically secure with themselves, help they younger ones. Those people are great.

In addition, women who were members of racial-ethnic minorities sometimes reported choosing mentors that spanned both areas, and that the racial-ethnic similarity might be especially important. An Asian-American woman described it:

I think one of the good things about being in both ethnic and gender minorities in this field is that I can draw from both. They have similarities. I find both the Asian and the women's community are very helpful because they realize the issues facing me.

Similarly, an African American woman noted,

I have interacted with the black faculty in the college of ....., all men, and we just connect and click. Spiritually and just fundamentally we're all kind of on the same page....They respect me.

### What Do Mentors Do?

In responses to open-ended questions on the surveys and lengthy descriptions in the personal interviews, the women described how mentors had helped their careers. Most often mentioned was the way in which mentors provided career advice, from assistance in choosing research topics and graduate schools, to feedback on research proposals and writing, to advice on where to apply for jobs and strategies to use in the job search. For example,

They reviewed papers and proposals, gave me advice for different types of decisions, encouraged me to stick my neck out and take some chances.

*[my mentor]*  
She helped me through the application process...She gave me tips on interviewing and negotiating.

Although he was in a very different field, he [my mentor] would read grants and I would talk to him about how to run my group and how my research was going. My group held joint group meetings with his group regularly, and he would serve on my students' committees.

[A senior faculty member and I] taught different sections of the same course and he initially provided the syllabus, set up all the demos, and let me come to his class to observe.

A number of women also described how, in addition to providing specific advice, their mentors went out of their way to promote their careers. This involved actions as diverse as introductions to prominent researchers in their area, invitations to speak at professional meetings, talking about their work to funders and others who could promote their career, and nominating the women for awards. For example

He put forth my name for editing journal articles, grant reviewing, and conference organizing. He encourages me to publish and write grants and connected me to funding opportunities and collaborations.

One...knew my NSF program chair personally, and got me to call up my program chair and introduce myself and get some general grant-writing advice that was very useful....My thesis advisor also acted as a mentor after I started my faculty position, by inviting me to speak at a National ACS meeting very early in my career.

Finally, several of the women mentioned how mentors provided emotional support and encouragement. They helped build their confidence, they provided advice in times of stress and conflict, and they served as "cheerleaders" as career transitions were made. They also made social overtures that promoted feelings of belonging and inclusion. For example,

He taught me not only the research stuff, but also to value myself as a strong individual with meaningful contributions to make.

They often provided assistance with networking and dealing with political situations both within the department and institution.

She made sure that I got whatever information I needed, made sure that I joined her group for lunch, [and] did all the right stuff.

A woman who dealt with issues *related to* both gender and race-ethnicity reported how her mentor helped her deal with discrimination based on both characteristics:

He made me become aware of how to deal with people, how to be more vocal, how to talk to people, and so on and so forth, and kind of coached me...I really appreciate him. He really spent time with graduate students, so I've been very lucky.

### Changing Roles During a Career

Several women reported changes in the role of the mentor as <sup>their</sup> career <sup>5</sup> progressed. Women who were more senior reported seeking out people at their own career stage for advice and counsel, often in other fields. However, several of those at more advanced stages of their careers noted the difficulty of finding someone who felt comfortable working with them at that stage and even that a once productive and rewarding mentor-mentee relationship had soured due to professional conflicts and other issues. For example,

He changed his mind [about mentoring me] last year <sup>and</sup> decided that I was intimidating and has stopped mentoring me.

He decided that I was intimidating to the staff and stopped mentoring me and chooses instead to block my advancement and full participation in the department...~~I believe that they are intimidated because I am a smart, confident, capable woman, and they don't want to be led by me.~~ <sup>advice</sup> The trouble started when I assumed a leadership position that involved staff reporting to me.

My chair kind of protected me and respected me, as long as I did stuff for him. Later on, when I wanted to challenge him, he didn't like it.

On the other hand, some of the interviewees reported long-lasting relationships that matured and grew, remaining helpful and highly regarded for many years.

My boss and another colleague in my Department have been excellent mentors. They have been wonderful role models who have created endless valuable professional opportunities for me. They have included me in projects, sent opportunities my way, nominated me for awards, given advice, reviewed my work, given excellent feedback....everything one would expect from a mentor. They have made a significant impact on my career, and as a result of working with them I believe I have been probably <sup>four</sup> times more productive than I would have without their guidance and leadership.

I have continued to stay in touch with my PhD advisor and also my other colleagues along the way to talk about the ups and downs of jobs, applications, etc.

My former research advisor continues to be a wonderful mentor. While many of the things he did for me in early years are no longer necessary, he still helps with things like award nominations and his words of admiration and approval still make me feel great.

### "Official" Mentorship Programs

Some respondents reported that their departments had official or organized mentorship programs. Occasionally the respondents reported that the officially appointed mentor was helpful. For example, one noted that

[my] assigned mentor from the department...stood up for me during hard times [and] listened...[This was] very important to me because the tenured women and some of the "older male" faculty in my department were not so supportive.

Several others, however, noted difficulties with the mentor that had been assigned to them and that the people who ended up being most helpful to them were often not those who had been officially designated as mentors. Because the impact of formal mentoring programs was not an explicit focus of the interviews or survey questions, these examples are especially telling.

I was assigned to work with someone who had no interest and wasn't willing to take the time to mentor.

The mentors assigned to me by my department did not wish to be mentors

[I] enrolled in a mentor program at my university for new faculty, but my assigned mentor had a very busy year and ended up backing out of the program

I had ~~one~~ [a mentor] "assigned" by the Dean, but this was useless. I developed an external female mentor in another department... This current mentor helps identify potential awards, answers questions about career planning (which committees to serve on and which not to, etc.) She has also been active in helping to bring the issue of lack of women to the Dean's attention.)

A mentor was formally assigned by the department. But I don't trust him. He has already tried to manipulate me at least twice. Actually the first time that I talked to him after I was hired, he told me that he had argued against hiring me, though I will occasionally ask him for advice.

I didn't find [the formal mentoring committee system] very useful because one of the people that I sort of had a conflict with ... was my main mentor.

All that [my formal mentor has] done basically is told me that I need to get external funding, and that that's what I need to focus on, writing big grants rather than small grants.... He's even being paid to be my mentor, and... I don't feel like he's put any time into that.... They actually have these formal guidelines... for how it's supposed to be done, and he didn't really have any interest because it's just too time consuming.

When I went to ... they teamed us all up with mentors, and we met each other for a few times. My mentor was a very nice man but he just didn't have time after we



had all been assigned. It just didn't work out... You have to find out who's interested in what type of research so you can find out whom you can collaborate with quickly.

### Why Does Mentoring Not Happen?

Recall that over half of the women surveyed did not have mentors during their educational training and early careers. Some of these women reflected upon why they did not have mentors. Some of their responses involved their own actions, such as not knowing how a mentor might help and/or not knowing how to approach others for help. For example,

I did not know [I] needed one and none were available

I did not understand the system, was unaware of mentoring

No one ever suggested I should have a mentor

I am currently in my fourth year as an assistant professor and I have had no mentors thus far. I was the first female faculty member hired in my department in a new research area. Therefore, I did not have many opportunities to interact with other faculty, unless initiated by me. I often feel awkward asking questions that might make me look "stupid," and therefore I often feel isolated in my department.

Others (and occasionally the same respondents) noted that mentorship of young faculty did not seem to be a priority at their institution and/or that more senior faculty members were not interested in pursuing this role. For example,

It was difficult [after becoming a faculty member] to find a formal mentor who had time or who was genuinely interested in investing in you. I have an official mentor from the university who I would contact when I had questions or needed feedback. I would be the person to initiate this since this person was also the mentor for several other people in the department and he was also a very busy person....The natural mentor in my field did not seem interested and would often say that ~~they~~<sup>he</sup> did not have time to meet with me.

[There were] no women in senior positions and no men who seemed willing to help.

There was no one willing to dedicate the time to mentoring during my early tenure track years.

There is no requirement to have a mentor to assist junior faculty in the career development in our college

There was no mechanism for having a mentor [in my department].

### Making Mentoring Happen

Finally, however, the surveys and interviews provided insight into how mentoring can be promoted and developed. In part, this involves individuals seeking out mentoring opportunities. One person described her experiences,

...Starting in 1984, I've gone to every single ACS meeting. There are a lot of people who do that, but there are also a lot of people who don't do that. I did with the express purpose to really get to know people, And have them get to know me. I presented a lot. I went to the ....Conferences and was generally very impressed how easy it was to get to know people, to talk to them and sort of talk myself up. That was a little difficult....

Others described how their departmental culture and climate made mentoring an integral part of the organization's day-to-day life and norms of collegiality.

Even though there was no assigned mentor to me in the department at ...., I think the environment mentored me and everybody else in terms of group development, the whole package.

*[collaborative]*  
Our department is really good at making sure that there are collaborations. Like the senior faculty would be like "I want you to help me with this grant." We are good at. And we still do that. When someone is new there we try to get them started<sup>in</sup> something that is collaborative. So, [there are] not true mentors I would say, but when someone is new we try to get them started with collaborating.

In short, these examples illustrate how some women have promoted their own mentoring activities and how departments can develop cultures and practices that support and mentor all faculty members. The activities of COACH have incorporated these themes, and we now turn to a description of these activities and a discussion of their outcomes.

### How COACH Promotes Mentoring

COACH has used two different routes to alter the culture of mentoring in Chemistry. One focuses on women chemists and the other focuses on departmental cultures and leadership.

### Women Seeking and Being Mentors

COACH's professional development workshops for women faculty have been held at national professional meetings and at individual institutions. Workshops have sometimes focused on participants at different points in their careers, such as post-doctoral fellows, assistant professors, or more senior faculty; and on participants with multiple concerns and possibilities of bias, such as women who are racial-ethnic minorities. Since 2001, over 400 women chemistry faculty members have attended these COACH developed workshops at national professional meetings. It is estimated that over one third of the women faculty who hold tenure track positions at the top 100 chemistry departments in the country have undergone COACH training at the national meetings or at their home institutions.

The workshops have two general aims: First, they are designed to help women develop skills to facilitate their career progress. Experts are employed to provide training in areas as



varied as communication tactics, negotiation skills, and leadership strategies. Second, they are designed to provide a venue for participants to network with other successful women chemists. By bringing women together from around the country in an atmosphere that is professional, but removed from immediate work obligations and roles, they promote the development of network ties and establishing new relationships.

Evaluations of the workshops, both immediately after the events and up to several years after their occurrence indicate that participants believe that the trainings have contributed significantly to their career progress and their professional well-being. The results also indicate that the workshops motivated the women to help others within their profession. For instance, in response to a survey sent to COACH <sup>attendees</sup> participants several years after their first participation, two thirds of the women said that the skills they had learned through COACH had helped them develop supportive networks, either "quite a lot (22%) or a fair amount (45%). Only five women said the skills had not helped them in this area. Almost as many women (60%) said that the skills acquired through COACH had helped them mentor others.

The data also indicate changes over time in the percentage of women reporting that they have received mentoring. Women who have attended COACH workshops in recent years and those who received their PhDs more recently have been significantly more likely than other women to report mentoring both during their education and the early stages of their careers (Greene, et al, 2010a)

#### Changing Department Climates

COACH has also focused on academic leaders within chemistry and, in 2006, conducted a workshop entitled "Building Strong Academic Chemistry Departments through Gender Equity." The workshop was sponsored by three federal agencies that provide the vast majority of research funding to chemists in academia ~~and was attended by~~ department heads from the departments that receive the most federal research and development money and/or produce the largest number of PhD students. ~~It was designed to develop awareness of the problem of women's under-representation in academic chemistry, to motivate leaders in the field to work for change, to develop concrete steps to address the inequities, and to obtain commitment from participants to seeking change.~~ As with other COACH activities, the efficacy of this workshop was carefully evaluated. Attendees were required to complete a questionnaire that examined their attitudes and perceptions regarding women's representation in chemistry both before attending the workshop and after returning to their home institutions. In the months after the workshop the chairs were also charged with reporting on specific actions they had taken with regard to gender equity on a password protected website open to other department chairs.

Analyses of these data indicated that the heads who attended the workshops became more aware of how the lack of mentoring can impact women's career progress and committed to changing their departments' culture and ways in which it supports young faculty. For instance, before the workshop, half of the attendees believed that few available mentors was either "not an issue" or "not important" in affecting women's career progress. After attending the workshop, however, ~~this percentage had halved~~, a change that was highly statistically significant. The chairs' reports of the action items to which they committed after attending the workshop also indicated a strong focus on mentoring. Of the 45 heads who listed goals and action items on the group's website, over half (26) indicated activities that would assist career development, such as a mentoring program. (See Stockard et al 2008 for a full report on the workshop.)

### Looking to the Future

There are, of course, limitations to the data reported above. For instance, even though the women in our sample represent a relatively large proportion of those in the discipline, we have no way of knowing how representative they are of the total group. In addition, we do not have comparable data on men or on people in other disciplines. Finally, we are not able to provide controls that can help indicate the extent to which the results we found are attributed to the interventions of COACH or to other changes within the discipline or academic enterprises as a whole. Thus, future research in this area is necessary.

That said, we believe that the results summarized here provide important insights that can guide those concerned with promoting successful careers for all scientists and especially those, such as women and members of other under-represented groups, who have historically faced bias and discrimination. First, our results indicate that mentors are important. Most of the respondents believed that their mentors provided important career assistance. Second, only a minority of the women in our sample reported having mentors during their education and professional training or the first ten years of their career. Thus, there may well be an unmet need for mentoring help. Third, the results suggest that mentoring may have become more common in recent years, perhaps resulting from women seeking out and providing more mentoring support as well as department heads becoming more aware of this need. The evidence associated with the evaluations of COACH sponsored workshops suggest that these efforts have contributed to these changes. Fourth, official mentoring programs are not always effective and it appears that care must be taken to ensure that mentors and mentees are well matched and that mentors are committed to their roles. Even more important may be developing departmental and discipline-wide cultures that are supportive and mentoring to all young scholars, now matter what their background may be.

COACH

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