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Conference paper

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My journey in academia: things not on the CV

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Abstract: I am a professor at Chalmers University of Technology in Sweden. I trained in chemistry in Sweden but went to the USA for my postdoc. I remained there for 12 years, being faculty at two American universities, before I returned to Sweden for a professorship in the northern city of Umeå. More recently, I returned to my *alma mater* Chalmers University of Technology in Gothenburg, where I have taken on senior leadership roles. On paper, my career trajectory looks straightforward, but there are many detrimental aspects and lucky coincidences that are not listed on my CV. Life in academia is never easy, and one is never 'done'. But working in academia is wonderful, as it provides so much freedom and creativity, including being very accommodating towards having kids. Here, I will describe my own personal journey, with the hope of inspiring young women to follow their own path in academia. Yes, there is still bias against women in academia, but change is happening, and the many benefits of being an academic beat such drawbacks.

Keywords: Distinguished Women in Chemistry and Chemical Engineering.

Introduction

It is not often you can write about yourself and your thoughts. But now I have a rare chance to do so, and I am taking it! Here, I will describe my academic career path, including aspects that one cannot read in my CV, which resulted in me eventually reaching the position I have today. By giving myself as an example, I hope to mediate the message that *we can all do this*. Nobody is perfect, not even professors; there are always worries and roadblocks on one's path. In recent years, I have engaged a lot in gender equality issues and I now run a big initiative on my campus. Doing this work means I read a lot of scientific studies on the topic and I hear many sad stories from female faculty and students. Therefore, here, I want to spell out positive aspects of being in academia. There are many! After describing my career path and my research, I will discuss gender issues, having kids and some personal challenges that never show up on one's CV.

My early life

I was born in 1968 in the Swedish town, Umeå. My dad was a PhD student at the newly-started university and my mom worked at the post-office. In 1976, when I was 8 years old, my dad got his PhD in inorganic chemistry and we moved to Gothenburg where my dad got a position at a welding company. During my childhood, I was a chubby, shy kid with a talent for math. My parents expected me to do well in school, and I did. I also played the piano and accordion (forced by my mother), but I did not do much sports. During high school, my math teacher challenged the class with problems at the university level. Most students were upset, but this made

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me interested in pursuing higher studies. Finishing high school was stressful to me, and likely that is why I got anorexia in the last semester. Although my mom did not allow me to go to California as an au-pair girl before I was well, I still went. I struggled with the disease during that year and not until I got scared I would die (when at 37 kg), did I start to recover. I am fine now, but I will likely never have a normal relationship with food. The year in California was a helpful break and I grew up as a person: I had to take care of myself and the kid I was watching. And, I realized that changing diapers was only fun for a while. Back in Sweden, I started the chemical engineering program at Chalmers University of Technology, a 4-year program that leads to the award of a combined Bachelor/Master degree. This was the only program with female students, but in reality I took it because my grades were not good enough to get into the physics program. I barely got into the chemistry program: I was on the reserve list and got called in the same day it started! Already during the first week at Chalmers, when we visited many industrial settings to get inspiration for what the degree could give us in terms of jobs, I realized that I did not want to become a chemical engineer, I was definitely more geared towards basic science. Starting university was a new life for me and I became a different person. The shy Pernilla was gone and I enjoyed those years enormously and got many lasting friends.

Pursuing research

The last year in my program at Chalmers, I was an exchange student at Imperial College in London. I had thought about this study-abroad option since I started at Chalmers. This year truly became a game changer. I was put into a Master's program at Imperial that involved doing chemical research. Thus, while my fellow students from Chalmers (we were 10 in total going to Imperial that year) did normal lecture-based programs, I was placed in a lab and got assigned a research project. This was the first time I met research and I truly loved it.

When I returned to Sweden with my degree in chemical engineering, I immediately left for 3 months of backpacking in Asia with one of my sisters. It was a reward for both of us, after years of studies. Interestingly, local youth in Thailand and Indonesia were very interested in my sister's plans to become a teacher, whereas nobody cared about my plans to do research. I think I already then realized the importance of explaining what you do in an interesting way. After that trip, I started PhD studies in Physical Chemistry with Prof. Bengt Norden at Chalmers. Prof. Norden was an inspiring person, but he did not do much supervision. For me, this turned out to be great: I had my own ideas and pushed myself. I remember my PhD years as a wonderful time when I came in to lab every day and just did experiments, although my mom worried that I never did anything else. After 4 years, December 1996, I defended my thesis. In Jan 1997 I got married to Patric, who was my classmate in the undergraduate program. The wedding party was a sort of good bye party as I moved to Pasadena, California, in February 1997, for a postdoc at California Institute of Technology (Caltech) with Prof. Harry Gray. I had been awarded a fellowship and I wanted to go somewhere 'fun'. I applied to a few labs and, before making my decision, I went to visit them. It turned out that I did not like the most prominent lab, that of a Nobel Prize winner, so I picked Prof. Gray as, like the case with Prof. Norden, he was such an inspiring person.

At Caltech, I saw my fellow postdocs in the lab apply for faculty positions. That is when I realized what an academic career is and I thought 'professor sounds cool'. I had no clue what it meant, but going back to Sweden sounded boring. Already during my first year as a postdoc, I applied for assistant professorships in the US. The first ad I found was from Stanford. Innocently, I thought: that's a good school, I want to work there. In the end, I applied to around 10 universities – merely for fun. But when I got called for interviews it suddenly became real. I interviewed at three places and I got a faculty position in the Chemistry Department at Tulane University in New Orleans. This was not because I had great proposals; no, when I look back at them they were very naïve. But I think I showed an enthusiasm that they liked. At first, my husband was unhappy: New Orleans was the only place he told me to not apply to. He had been there and thought it was too hot and humid. After completing my 2 years of postdoc, I started at Tulane in January, 1999. The good

thing about knowing for half a year in advance where I would go, was that I could start to prepare an NIH application and look for students early. My husband had worked for McKinsey & Co. on American projects during my postdoc years; we saw each other on weekends. With a tenure-track position in New Orleans, which hinted at a long-term commitment, we said we must live together. Luckily, he got a job with one of the few big companies that were in New Orleans.

Becoming professor

I was the first female faculty in the Chemistry department at Tulane. (Sadly, since I left in 2003, they have not been able to recruit a new female faculty member until 2018.) The other chemistry faculty were very supportive of me. I went up for tenure early. This was not my choice, but my dean told me I was ready and I simply did what he said. Again, I was very naïve and did not know so much about the American system. Within the first 2 years I got both NIH and NSF funding. I remember I cried when the NSF officer called me to say I got the grant: he was angry I had applied to both agencies with roughly the same proposal and gave me less money. I submitted my tenure package in 2001 just before Selma was born, and I got tenure and was promoted to associate professor in 2002. Later my dean told me that he had pushed for early promotion so I would not be recruited elsewhere. Well, I still left a few years later, truly due to a coincidence. My husband and I organized an annual party for Chalmers alumni in America. We did this in our house in New Orleans, and about 30 people came. Most alumni had top positions in industry, but one guy was a professor like me. He told me that to get a higher salary, you need to apply for jobs at other universities. And he said, send me your CV. I did and half a year later Rice University wanted me to visit for a possible hire. Rice University is in Houston, Texas and I had never been there. Naively, I thought most people there were cowboys. But I went for the interview and to my surprise I really liked the place. Rice University is more prestigious than Tulane, and Houston is an ‘learned city’ with several universities, hospitals, and institutes. I realized the student quality would become better there. Also, my husband’s company wanted to transfer him to their Houston office, so it became a win-win.

I started at Rice University in 2004 as a tenured associate professor. It is tough to start up again and it was very helpful that I had a postdoc moving with me. In 2005, we had another daughter, Hilda. With two little kids, we got to know other families and made friends we still keep in touch with. For a while, it felt a lot like a ‘normal’ life. But after some years, we began to think about returning to Sweden. There were many reasons for this, but a major one was that we thought we wanted to raise our kids in Sweden. My husband and I had no experience of the American school system, so it became a bit scary to think about our kids being raised in it. In addition, Swedish kids have more freedom than in America. Also, on a long-term perspective, it did not work to go back to Sweden every summer for 2 weeks’ vacation. So I started to look for positions in Sweden. Surprisingly, Umeå University opened a search for seven (full) professors in Chemistry. I applied, mostly to show off my CV on the Swedish market. Umeå is far north in Sweden, and a small city with, what I thought, few jobs for my husband. But, I was immediately offered a position and I went to visit. I really liked it, despite the fact that it was dark all the time as my visit was in December. What affected me most, truthfully, was the lunch menu from an elementary school. I felt that my kids must get this type of food. My husband also went to visit, and he found a job, so we moved to Umeå in 2008, almost 5 years after we had arrived in Houston. With this, I had messed up my secret back-up plan, which was to return to Sweden if I failed in America. Now I had returned to Sweden for other reasons.

Back to Sweden as senior faculty

Becoming a chemistry professor at Umeå University changed a lot for me. Instead of being a foreigner, that had to fight extra hard, now I was considered a senior faculty member with unique experiences and I quickly became an informal leader. I enjoyed the time in Umeå tremendously. I got great colleagues and I learnt

about the Swedish academic system and the people in it (which I had not followed while I was in US). Even my parents were happy, as they could visit us and, at the same time, see old friends from the time they had lived in Umeå. I got a good starting package, but after some years, things changed. I like teaching and I have always done general chemistry teaching for first year students. However, now we should let faculty without resources do the teaching and people like me, with external grants, buy ourselves out of teaching. I started to feel frustrated. As a way to get new energy, I set up a sabbatical semester at Caltech and brought the whole family along. It was very helpful that we all had American passports. The kids attended 3rd and 7th grades in an all-Hispanic school near the Caltech campus. The first months were very tough, but in the end nobody wanted to go home. Truly a family adventure I can strongly recommend.

During that semester, I got an offer to move to Chalmers, my *alma mater* in Gothenburg. Chalmers had decided to start a new department, Biology and Biological Engineering, and they wanted me to become division head for one of the department's four divisions. It was bad timing as we were on sabbatical, but there were clear advantages over Umeå. Gothenburg is a bigger city with more job opportunities for my husband, and we would be closer to our relatives. It was also a new challenge for me to act as division head. So I said yes. The decision did not land well with the kids. I got to hear 'mom, you only care about work' and 'you are destroying my life', and that was tough. It took a few years, but now they are happy about the move. It became 7 years in Umeå before starting at Chalmers in September 2015. In contrast to the US, I could not bring my instruments with me when I moved. However, Sweden is much more open to sharing and Chalmers had almost all equipment I needed. So it was easy to start up. I believe my background at Chalmers (although I was gone for 20 years) puts me in a stronger position to improve things on campus today. Mobility is important in science. Every time I have moved universities, my research has developed, because of new inspirations and colleagues and, most important, I have grown as a person.

My research topics, a continuous development

For my PhD, I was doing spectroscopy on DNA analogs (peptide nucleic acids) and DNA interactions with a recombination protein, e.g. [1–4]. When I started my postdoc, I switched topics and went into the then emerging field of protein folding, e.g. [5–7]. Most of my postdoc was spent at a laser table in a basement, trying to detect kinetics of protein folding using electron-transfer triggering. And I measured the folding speed of one of the fastest-folding proteins there is [7]: this is my scientific 'world record'. I never got totally comfortable with the laser set up, so when I then started my own lab, we turned to (slower) stopped-flow kinetics, e.g. [8].

I realized during my postdoc that the proteins we used for electron-transfer triggered folding, metalloproteins, had not been studied with respect to the role of the metal in the folding process. Thus, I set out to do this when I became an independent group leader at Tulane. In parallel, we also started to work on oligomeric proteins, addressing the analogous question of how protein-protein binding would couple to folding, e.g. [9, 10]. In a way, these were new areas, as most folding studies at that time had been performed with simple proteins containing only one polypeptide chain and no cofactors. Key to the success of my initial research was that we early on discovered that metal ions could interact with unfolded proteins, e.g. [11, 12]. After moving to Rice, we continued our various kinetic folding studies, e.g. [13–16], and we started to address how the crowded cellular environment affected protein folding, e.g. [17–19]. This was an emerging field and, together with a colleague in town (Margaret Cheung), we started a subgroup at the Biophysical Society on the topic. In part due to NIH feedback on my renewal proposal, we also began to study human copper transport proteins, e.g. [20–25]. The reviewers suggested to focus on human proteins instead of bacterial model systems and, because there are no free metal ions in cells, to consider the systems that deliver metals to target proteins. So we did.

Over the last 10 years, we have done a lot of biophysics on copper transport proteins, especially the cytoplasmic copper chaperone Atox1, and it has brought us to cancer research today [26–28]. We recently discovered that Atox1 may act in cancer cell migration, which is the first step to metastasis. To be fair, this discovery was only possible because I got a postdoc with cancer biology expertise. I did not look for her; she approached me when it did not work out with her current advisor. Early on in Umeå, we also started to study

protein misfolding and aggregation. This was not a planned direction, but another coincidence. I had hired a new postdoc, and his experiments on small molecules affecting protein folding did not work. He suggested to instead try an amyloidogenic protein. This was the beginning of many interesting discoveries around small molecules and alpha-synuclein, the protein forming amyloids in Parkinson's disease, e.g. [29–33]. Today we study α -synuclein amyloid formation in our unique way: focusing on cross-reactivity with other proteins, membranes and metal ions. I feel that the biological relevance of my research activities becomes more important to me the older I get. One has to be humble approaching new research directions, but such transitions also bring in new ideas and viewpoints.

My path into gender issues

During my early career in America, I did not think much about gender issues in academia. I knew there were few women in science, but I think I just felt special by being one of the few. But, during my last few years at Rice, we got an ADVANCE program to the university and I became involved in running some women's activities. Also, I acted as a mentor to some younger faculty, and this started to open my eyes. Truly, it was not just the fact that there were few women in academia; the women there also faced unfair treatments. I learnt that there are numerous scientific studies with real data revealing the presence of gender bias (in hiring, evaluations, publications, etc.) [34–36]. I mention this here, because it is important to know there is data confirming gender inequality; *it is not ok to have any opinion you want* without evidence. It is a real problem.

When I returned to Sweden, I was surprised. Sweden is considered one of the most gender-equal countries in the world. We have the longest paid parental leave in the world, free daycare, schools, and afterschool programs, and men and women share a lot of household duties. Based on this culture, I expected no gender problems in Swedish academia, but I was mistaken. Female researchers still encounter gender biases in Sweden. I have many stories of my own and, truly, most female faculty and students have. The problem became more apparent to me when I moved from Umeå to Chalmers. Chalmers is an engineering school and, not only the faculty, but also the undergraduate students, are mostly men. Since I realized my colleagues outside Sweden did not know this, I wrote a text explaining that gender problems also existed in Swedish academia (<https://www.stemwomen.net/is-the-gender-gap-solved-in-liberal-sweden/>). That became the beginning of my formal engagement with this topic, although I have always acted as an informal mentor to young women.

Together with other Chalmers faculty, I recently wrote a proposal for a large initiative on gender equality that we called the “Gender Initiative for Excellence” (Genie). It was the right timing, just after #metoo, so the Chalmers Foundation funded it (<https://www.chalmers.se/en/about-chalmers/Chalmers-for-a-sustainable-future/initiatives-for-gender-equality/gender-initiative-for-excellence/Pages/default.aspx>). We pitched the idea as a way to make Chalmers more successful. Which is true: studies show that diverse teams do better science and publish higher impact papers [37, 38]. Genie started January 2019 and will run for 10 years, and I am its leader, at least for the first couple of years. In terms of funding, it is the world's largest academic initiative. That definitely puts a lot of pressure on me as the leader. But I strongly believe it is crucial to have successful faculty as leaders of this type of efforts. Faculty understand the problems on the ground, and can catalyze concrete actions in ways that are hard for human resources or administrative personnel to achieve. I know it hurts my scientific productivity to take on this role, but I feel a responsibility and I am in a position to act.

Despite these gender issues, I have never regretted my choices or thought about leaving academia. So I want to emphasize the positive aspects to women considering academic careers. One such thing is children. Many young faculty I have mentored worry that this career is not compatible with kids. It's a fair question: my dean at Rice University did not want to promote me to full professor because I had little children and she had chosen career over kids when she entered academia. I challenge this. If you want a professional career acting as a leader, any path you pursue (in a university, hospital, industry, business, start-up, government etc.) will require full dedication, many hours and a huge amount of internal drive. I would argue that *academia is one of the best places* to choose if you want to combine career with family.

Having kids as faculty

My husband and I set out to have a child during my postdoc. But it was not particularly easy as I did not get my period when stopping the pill. As a postdoc I happened to have a great health insurance and I got to try fertility treatments, which meant giving myself injections, going to the hospital to take blood tests, and checking my follicles every day for several cycles. This surely affected me, but I was very independent as a postdoc, so I simply worked around it. But I did not get pregnant, and then we moved to New Orleans. After some time at Tulane, I dared to ask a colleague in another department for his fertility doctor, as he had just had triplets. Note, at this time, you did not speak about these things. It is not until recent years that I am comfortable describing this. So we did IVF – once. I thought we just had to go through it and, after failure, consider adoption. But it worked. I am still amazed.

At that time, many (of the few) senior female professors I knew in the US did not have children. For many of them, it had been a conscious decision to choose career over family as the combination was not acceptable. When I became pregnant, there was no precedent in my department, so I set my own rules. For example, I asked for a parking permit for a handicap spot just outside my office to have easy access to the office. My male colleagues even arranged a baby shower for the first (and probably last) time. There was no paid maternity leave, but I took my sabbatical the semester my daughter was born, and so I had no teaching duties. I ‘worked’ from home the first couple of months. Luckily, I had a great technician in the lab, who supervised my students while I was at home. When I moved to Rice University, I was surprised to learn that several female faculty there were also mothers. Each had found their own way to combine career and motherhood, whether with a stay-at-home husband or full-time nanny. But most of them had only one child, so when I became pregnant again in 2005, my female colleagues skeptically said I was brave. At that time, I had given up on another child. I had sporadic periods, but did not think much about it. But one evening I just did not like my daily evening chocolate treat (I love chocolate!) which made me suspicious something was going on in my body. To be sure, I did seven different pregnancy tests. I am considering this pregnancy as much of a miracle as the IVF one. When Hilda was born, I again took a sabbatical and worked from home for a couple of months, in combination with nannies.

Today, many things are different, also in America. There are more daycare options, more dads take parenting responsibilities, and universities as well as granting agencies often have policies around maternity leave. These benefits are helpful no doubt, but still many women feel there is no good time for kids, even if you are legally allowed to do so and financially compensated for your leave. This is often the dilemma that makes women leave academia: Women in academia report fewer children than same-age women with professions such as physician, lawyer, and chief executive and, among American tenured faculty, 70 % of men are married with children but only 44 % of women [39]. This should change. The unique aspect about being faculty, as compared to many other leadership roles, is that you have a lot of flexibility and you set your own schedule. When my kids were little I often brought them to work. I have been to several faculty meetings and university receptions with an infant crawling around. I have interviewed putative students on the floor at the same time entertaining a toddler. If they are sick, you can work from home while caring for them. When my kids began elementary school, I always started my workday after I walked them to school. Nowadays, they often come to my office and do homework or drink hot chocolate. Even if I put in fewer hours than before I became a parent, having parenting responsibilities has forced me to use my time more efficiently. Importantly, the challenges and rewards of being a parent have given me a wider perspective, which keeps me from taking rejections or critique too personally.

Life is not always easy

There are struggles in everyone’s life. We normally do not talk about these, although they affect our careers. When we read about successful female faculty, we only get the good stuff. Therefore, I will mention some of

the personal challenges I have experienced that cannot be found in my CV, but definitely have affected my career trajectory. There is nothing unique with my challenges, many women face these or similar issues.

First, like many females, I am a very insecure person, although I hide it. Through all the years in academia, I have worried if I am 'good enough'. And every time I have moved, I have worried about my ability to start up the research again. In part, I think I have pushed myself through many achievements to merely prove to myself that I can do it. I have tested different anxiety medicines; today I consider my daily SSRI tablet a natural supplement to boost my serotonin levels. I already mentioned my anorexia and fertility problems. The anorexia haunted me during all my years in America, but since I returned to Sweden, I feel much better. Likely because of my poor eating habits, I have been anemic as long as I remember and this probably explains why I never got a period when stopping the pill. Every few years my iron level goes below a threshold and I get symptoms that makes me scared. With the help of blood transfusion or iron injections, I get better but after some time I go back to old habits. But age helps. Today, at 51, I am still scared of failing but I also feel more confident about my expertise, and I want to think I take better care of myself.

In addition to internal complexity, in the last couple of years my parents have needed my help. This happens to most of us when we grow older. My mom got sick in 2014. I and my two sisters (Paulina and Petronella) spent a lot of time fighting with doctors and hospitals. After 1 year, they finally realized she had cancer, breast cancer spread to the abdomen. She got chemotherapy, and got a little bit better for a while, but within another year she died. I still feel angry with myself that I was not there the night she died. I had planned to go visit the day after. A while after my mom died, my dad started to show signs of dementia. That started the next battle with the health care system. It took time, but now he is in a service home for people with dementia and we need to continuously watch out for his care there. It is very helpful to have siblings. My two sisters mean the world to me and we support each other. Also, work related issues can affect you dramatically and take your time. A few years ago, a PhD student close to me took his life. I had tried to help him, and I thought I had done enough, but I still feel guilt that I did not do more. The message with this segment is to show that we can still do academic careers and deal with all kinds of struggles in life. In fact, most of us do, also professors.

Thinking back and ahead

There is a human story behind every CV or, in this case, an award. When I look back on my life, there are some key points. One is that I have taken the chances given to me. Even if I was scared, I have not resisted trying new things and challenge myself. I also have a very supportive partner. This is essential, especially if you have kids. And I love what I do. It is a life style to be in academia, work is always with you, but I truly enjoy that. Academia is a great place to work in; your job is to discover new things and interact with interesting people, all with a lot of freedom, flexibility and many opportunities to travel around the world. Research has taken me many interesting places. For example, I got to speak to the Swedish king at an event in Seoul, and I spent some scary weeks at a research institute in South Africa. I think I have always wanted to make a difference. Both in terms of research and, in later years, in society. I want to contribute new knowledge towards combating neurodegeneration and cancer; I also find it important to educate the public (especially the youth) and to make academia a more gender-equal place. I always have new goals in my head. Today, after 11 years, I truly feel part of the Swedish academic community. It is a very nice feeling, as I always felt like an outsider in America. I hope my story can inspire young women. My message to junior scientists aiming for academic careers is: where there is a will, there is a way. Academia needs more women and women's perspectives: there are many scientific questions still to be solved.

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they still do. I have graduated 15 PhD students by now, and several postdocs, technicians and undergrads have passed through the group: you have all inspired me. I want to point out Jessie Guidry who was a great resource at Tulane: thank you for convincing me I needed a staff scientist. I also have had great collaborators; the most important one being Margaret Cheung, we definitely inspire each other. In the last decade, my engagements on higher levels, such as in the Biophysical Society and Swedish organizations and committees, have widened my views and connections.

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