

1 **Completely Different! The Twists and Turns of Changing Scientific Disciplines**

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7 As researchers, constant evolution and learning are common practices. Most scientists
8 can relate to investing a great deal in becoming experts in a specific field we are passionate
9 about. While being a scientist means staying curious and excited about learning and discovering
10 new things, I never imagined these traits would lead me to change scientific fields immediately
11 after obtaining my Ph.D. Yet this is precisely what I did. Before my graduation ceremony, I had
12 already met with my new supervisor regarding a postdoctoral appointment in an area I had never
13 studied. It takes a lot of courage to pursue a professional career in science, particularly for
14 women, and even more to switch scientific avenues. A disciplinary change between Ph.D. and
15 postdoctoral appointments requires thoughtful analysis, research, and due diligence.

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17 As an early-career underrepresented female scientist who migrated from the Middle East
18 to the U.S. in 2000, I am familiar with professional and life challenges. Challenges are rarely put
19 under the spotlight; however, recent publications are beginning to shed light on the value of
20 sharing them (Rose et al., 2018; Bertolet et al., 2022; D'Andrilli et al., 2021). My career's twists
21 and turns may be more relatable to diverse researchers than previously thought. Challenges come
22 in different varieties across relationships, life changes, and project troubleshooting; they are not
23 solely limited to data processing or scientific advances. When we remember that challenges are
24 essential to our education and accomplishments, we become better people *and* scientists. For this
25 reason, I will share my own experiences changing fields in my professional career; this article
26 will highlight the twists and turns of stepping into unknown scientific territories.

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28 *Switching disciplines after my Ph.D. - why make the change?*

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30 There are important questions to ask and consider in moments of professional change: Is
31 switching scientific disciplines an intelligent choice? Will we enjoy the research even more? I
32 thoroughly enjoyed my Ph.D. research in organic chemistry and catalysis. I enjoyed the main
33 idea, laboratory techniques, and discipline needed to achieve success, crucial components as we
34 invest so much time and effort in our work. My switch in fields to an Arctic environmental
35 scientist came very unexpectedly. My passion for one type of chemistry took me into a new field
36 I had never thought of pursuing. Life is full of surprises and serendipity.

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38 As many postdoctoral and graduate students know, building a career and conducting
39 similar research as your advisor does can be very difficult. The advice I received from close
40 professors and mentors was that “You can either use your specialized expertise in another field
41 or stay in the same field and learn new techniques.” I chose to use my specialized chemistry
42 expertise in another field. Branching out seemed challenging, but I thrived in those moments.

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44 *My change from graduate school to postdoctoral fellow researcher*

46 In graduate school, my project was focused on developing new heterogeneous
47 “environmentally friendly” catalytic systems and their applications in various metal-mediated
48 organic transformations. I applied green chemistry techniques to optimize reaction conditions to
49 avoid the use of harsh organic solvents, high temperatures, difficult product isolation, and the use
50 of high pressure. (Hamdi et al., 2019). These novel environmental catalytic systems will allow
51 me to run organic reactions under ambient conditions (water as the solvent, room temperature,
52 atmospheric pressure, easy product separation, and catalyst recoverability/recyclability). Green
53 chemistry practices and environmental issues became a significant part of my professional
54 career, and I planned to pursue an industry job to engage in other green catalytic processes.
55 However, life is full of twists and turns.

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57 My work with green chemistry methods led me to an exciting postdoctoral position as an
58 Arctic environmental scientist. This postdoc position found me. I wasn’t looking to make a major
59 switch in fields. My focus was to get my Ph.D. and find a job doing the same work I was already
60 doing in graduate school. However, a mentor of mine recommended me for this postdoctoral
61 position, and her advice to me was to go for it. She thought that my ideas to take specific
62 processes and find ways to make them cleaner and safer would be a great addition to the polar
63 community. She said I could bring a new perspective. I thought a lot about what that would mean
64 and decided to take this chance and go for it!

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66 This work is entirely different from what I did for my Ph.D., which, at the outset, was
67 terrifying. My new position involved writing and submitting a National Science Foundation
68 (NSF) proposal, which I knew nothing about. Writing the proposal required a lot of work, and I
69 was lucky to have a great support system. This proposal aimed to evaluate the impact of diverse
70 Arctic dissolved organic matter (DOM) sources flowing through the Fram Strait that affects
71 marine carbon cycling processes. In August 2021, I received one of 13 NSF Postdoctoral
72 Research Fellowships designed for researchers like me, who apply their expertise to new
73 scientific adventures, ensuring vital first steps toward success. My new focus is evaluating the
74 impact of Arctic DOM on marine carbon cycling processes in the Fram Strait. This event marked
75 a sharp turn in my career in which focusing on environmental changes and impact has begun to
76 shape my developing research program.

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78 *Challenges I had to face after making the change*

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80 During my transition to polar research, biogeochemistry, and oceanography, I faced
81 significant challenges. I knew it would take time to learn new techniques, yet I did not realize
82 transitions are like marathons, not sprints. After several months, I started doubting myself;
83 maybe I was not ready for this challenge. Modifying my training and understanding demanded
84 great effort, and engaging in a new field provoked considerable stress. These new techniques
85 include preparing samples for analysis, learning how to use a variety of analytical instruments,
86 data analysis, and even as simple as cleaning glassware the analytical way. However,
87 perseverance opened the door to great creative thinking, especially for green chemistry method
88 development and reducing wastes in ecosystems experiencing rapid changes with climate
89 warming. Recognize your areas of weakness and find resources to help you strengthen them.
90 Ensure you are prepared before and while starting a new position. Make sure your leadership is
91 on the same path as you; their guidance is monumental to stay on track when challenges arise.

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93 New problem-solving perspectives can help make cognitive leaps to new solutions and
94 broaden collaborative team building (D'Andrilli et al., [2021](#)). I learned to demonstrate that
95 expertise can be a potential boon for colleagues across different research groups and with
96 cultural and language understanding. Every expertise is welcome in research, even on vastly
97 different topics than what you are used to. So, remember to give yourself credit and value. In the
98 end, no one can bridge between those fields but you! In the era of collaborative research and
99 interdisciplinary projects, you will be an invaluable asset in knowing about different areas.

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101 *Tips for switching fields: Ask for advice and be kind to yourself*

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103 If you're thinking of switching fields, I suggest that you ask for advice to help you plan
104 the transition and be patient. Based on my past experiences, asking for help was paramount, and
105 solid mentoring and supervision were required. This lesson was hard for me; I am an
106 independent person who is not comfortable asking for help. This experience humbled and taught
107 me that leaning on other experts in a new field strengthens me as a person, the team, and the
108 research itself. It is worth reiterating how important it is to be kind to yourself. Don't be so hard
109 on yourself at times of transition or new beginnings, and be patient with your project progress.
110 Switching scientific disciplines can feel like completing another Ph.D. at a rapid pace.

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112 Once I was kinder to myself and asked for help, everything fell into place. I worked
113 diligently and had a great mentor to guide me along the way. I can now confidently call myself
114 an environmental chemist. I have seen how much I have improved a year into my postdoctoral
115 appointment and how much room for growth I still have. This, in my opinion, is the soul of
116 research, working together and growing together as a team. It's all I hoped it would be.

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118 *So, how has the change in career path worked out for me?*

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120 For researchers like myself, who have the fortitude to start over in a new discipline and
121 can effectively market their abilities, changing fields can lead to a career homerun. After only
122 one year in this new field, I am proud to say that I made the right choice, and although the
123 change wasn't easy, I am happy and grateful I considered more professional paths to ignite my
124 passions. It was not easy, and yes, it was scary. However, it is an essential part of your life, and
125 as Jimmy Dugan (played by Tom Hanks) says in the movie *A League of Their Own*, "If it wasn't
126 hard, everyone would do it. It's the hard that makes it great." So, I encourage researchers to
127 consider every possible option, even the impossible ones. We all learn and thrive in different
128 ways, and somewhere out there is the perfect path and team for you. So don't be afraid to make
129 the switch!

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