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Reflections on Navigating a Pandemic: Perspectives from the Chemical Biology Community

Anne C. Conibear*^[a] and Nina Hartrampf*^[b]

The early-career researchers showcased in this ChemBioTalents special collection, and many others who have established their independent scientific careers over the last three years, have experienced a unique set of circumstances. The Covid-19 pandemic necessitated new forms of communication and interpersonal interactions: From online interviews and virtual networking to relocating and establishing labs during a pandemic, we faced many challenges, but also unexpected

Introduction

Almost three years ago, the onset of the pandemic and the various lockdowns and restrictions came as a surprise to many of us, and most people still remember where they were when the situation first affected them. Wanting to learn about the experiences of members of the chemical biology community, we began our interviews by asking about their memories of the Covid pandemic outbreak. The most surprising response came from Johannes Karges, who was in Wuhan, China! He had difficulty leaving the country due to the initial restrictions but then traveled directly from China via Germany to the USA to start his postdoc just before the closures began. Another person who started a new job at the beginning of the pandemic was Nina Hartrampf. Her first day as an assistant professor at the University of Zurich coincided with the first day of closures in Switzerland, so she started her job in home office. While

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¹Almost every person who was interviewed mentioned that they were overall quite lucky. Many early career researchers were more negatively impacted in their career options by the pandemic, reasons for which are manifold – some had to take care of family members, while others were not able to cross borders, were unable to finish experiments for publications, or were negatively impacted by the low number of open faculty positions. Although we tried to include balanced views from various career stages and many parts of the world, we acknowledge that those stories are not captured in this editorial.

opportunities. In this perspective, we reflect on this unique and formative time through personal anecdotes and viewpoints, trying to capture diverse experiences from the Chemical Biology community and beyond. We have tried to get a broad and varied set of perspectives, however, the selection is biased towards researchers who were able to start their independent careers.¹

Johannes and Nina were rather surprised by the rapid developments in early 2020, Stephan Hacker - then still a Liebig Fellow at TU Munich - was already thinking about temporarily closing his lab when the official government guidelines were announced, but was mistakenly under the impression that this would be over within a few weeks.

Many of the young researchers we interviewed were still postdocs or junior group leaders in 2020 - usually in a foreign country, far from their social networks, family, and friends (Figure 1). Although international research experience is required for most academic and many industrial positions, the pandemic brought many uncertainties and unexpected challenges: it was difficult to make new social contacts due to Covid restrictions; border crossings and visits home became nearly impossible, which was especially isolating for international researchers. Emma Watson was in Sydney when the pandemic broke out and was about to leave for a postdoc in Switzerland. She mentioned that it felt difficult and unsafe to leave Australia during the strict border closures, but she was able to move to Switzerland in July 2020. She adds that because of the timing, she did not have to miss a single day in the lab due to lab shutdowns! However, starting an international postdoc during the pandemic made it difficult to build a professional or social network, or to engage with the language and culture of the country, as there were no group activities, departmental interactions or conferences during this time.

The change of pace forced by shutdowns was appreciated by some. Kathrin Lang had a very busy time in 2019/2020, as she had to submit her tenure package at TU Munich, apply for her current position at ETH Zurich, and additionally prepare an application for an ERC Consolidator Grant. When all meetings and interviews were then moved online or put on hold starting in February 2020, it was initially a welcome recovery break. As Kathrin received tenure at TUM, there was no immediate pressure to move, and the delay was therefore OK. We received a similar reaction from Yuan Qiao, who said "To be honest, I was very anxious and stressed about the whole 'setting up a lab', 'running a research lab', and 'tenure clock' thing, when I started

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Figure 1. Schematic map to highlight where contributors to this perspective were at the beginning of the pandemic in 2020, and where they are based today. Due to space limitations, moves within Europe are represented as a single pin.

this position in Nov 2019. When the pandemic struck and we had to close down the lab in April in 2020, it actually forced me to slow down and take a much-needed breath." Like many other researchers that we interviewed, she adds that this helped her put things in perspective, "I had more time to connect with my young sons (who were 3 years and 10 months then) and family and to focus on better self-care. I felt refreshed and stronger when I stepped back into the lab after that period."

Applying for Positions During a Pandemic: Are Online Interviews Here To Stay?

The process of applying for academic faculty positions has similar formats around the world, and typically involves written applications, several rounds of interviews and conversations with current faculty, and possibly negotiations with faculty leadership. Whereas submission of written applications online was already standard practice in most places before the pandemic, conducting interviews online was not so common-



M.Sc. in Chemistry at Rhodes University (South Africa), followed by a PhD (2014) at The University of Queensland (Australia) in the group of David Craik, focusing on cyclic disulfide-rich peptides. In 2014, she was awarded an Interdisciplinary Cancer Research fellowship at the University of Vienna (Austria) and worked in the group of Christian Becker on targeted immune-stimulating molecules for cancer therapy. She returned to the University of Queensland in 2019 with a UQ Development Fellowship and in 2022, she took up a tenure-track Assistant Professor position in Protein Chemistry at TU Wien (Austria). Her current research focuses on how post-translational modifications regulate protein structure and biological function.

Anne Conibear completed her B.Sc.(Hons) and



Nina Hartrampf studied chemistry and biochemistry at Ludwig-Maximilians-Universität München (Germany) and obtained her Ph.D. in the field of natural product synthesis and chemical biology in the group of Dirk Trauner. She then joined the group of Brad Pentelute at the Massachusetts Institute of Technology (USA) for her postdoc, where she worked on the optimization of flow-based peptide synthesis using an automated synthesis platform. In 2020, Nina joined the University of Zurich (Switzerland) as an assistant professor. Her research group focuses on the development of new tools for flow-based peptide synthesis, as well as the chemical synthesis of posttranslationally modified peptides and proteins. In 2019, her work was acknowledged with a Bert Schram Award of the American Peptide Society, in 2021 she was awarded the Bachem Award for Peptide Science, and in 2022 she received the Thieme Journals Award.



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place and led to a steep learning curve for both applicants and selection committees.

In some regions, the number of academic faculty positions to even apply for was drastically reduced – in an already highly competitive job market. For example, most universities in Australia/New Zealand imposed a hiring freeze during the pandemic, and only five or six continuing positions in the chemistry/chemical biology field opened up over the last few years. Emma Watson, who planned to return to Australia, started applying even before leaving for her international postdoc. In India, hiring also slowed down drastically, as energy and resources were directed elsewhere, and hires were only made in areas that urgently needed people (Vishal Rai). The pandemic, in some cases, also changed where early career researchers decided to apply for positions. Whereas Anne Conibear broadened her search to include Europe as well as Australia and New Zealand, Johannes Karges narrowed his focus to positions in Europe because the period of not being able to travel for significant family events had a role in shaping his priorities in where to apply.

For most of the new faculty that we spoke to, online interviews were their only experience, and so they could not easily compare their pros and cons with in-person interviews. Several commented that, because everything was online, they did not feel part of a "cohort" of applications with shared experiences in a round of applications. It was therefore somewhat isolating and difficult to compare or discuss experiences or obtain feedback after interviews. Nevertheless, the skills needed for interviewing online were acquired quickly by both applicants and selection committees, and the flexibility for interviewing a broader pool of applicants was appreciated by many. A combination of online and in-person interviews seems to be the way forward, both in industry and academia, with a first round of video calls, followed by a second round on-site for selected applicants (Kathrin Lang, Stephan Hacker, Ingo Hartung). Emma Watson commented, "I think holding interviews online increases the fairness of the process and can open up more opportunities for candidates who apply from overseas. Travel costs are no longer an issue and so selection panels might be willing to interview a larger number of candidates. However, the time differences can make the process quite taxing!"

In hiring for positions that are more "permanent" than tenure track positions – such as industry positions, or tenured positions – there is even more emphasis on making sure that the candidate is a good personal fit for the department. Whereas scientific qualifications can be relatively easily evaluated in a virtual format, whether the candidate fits within the team is at least as important, and much harder to judge in a virtual setting (Ingo Hartung). Although experienced interviewers can, to some extent, judge the "fit" from an online interview, this is perhaps more challenging for the candidate, for whom the decision has more personal implications.

For some of the new faculty that we spoke to, pandemic travel restrictions meant that, once an offer was made, the negotiation and final decision processes also happened virtually. For several candidates, this meant deciding to move to a city or institution that they were not familiar with or had never been to. It was encouraging to hear of examples where the selection panel was very supportive, for example giving a video tour of the campus and organizing online meetings with current faculty (Emma Watson, Stephan Hacker). In other cases, having previous in-person contact meant that continuing negotiations and making arrangements for moving could proceed smoothly via online formats (Kathrin Lang). Even facing some of the challenges could be viewed positively: *"The experience of moving overseas for a postdoc and getting an academic position during the pandemic was incredibly challenging, and yet empowering. The knowledge that I could overcome these difficulties gives me confidence that I will be able to face whatever the next hurdles might be" (Emma Watson).*

Building and Mentoring a Team

Building up a new lab, perhaps in a different city, country or continent is a demanding task at any time, and involves many aspects that are almost impossible to do virtually. One of the biggest challenges at the beginning of an independent academic career is making the transition from being a group member and mentee to mentoring and leading a group of students and postdocs. Bringing a group of people together and establishing the culture of a new (research) group is difficult when social activities and even joined lunches are forbidden. As a community, many therefore experimented with various digital formats that allowed social online events, have broadly improved digital communication, and are now included in our daily workflows. Stephan Hacker, who moved from TU Munich to the University of Leiden to start an Assistant Professor position, adds that he has already benefited from this newly acquired expertise: when he moved, one of his students stayed in Munich for the final period of his Ph.D. Remote supervision went smoothly because communicating through virtual meetings already felt natural to both.

During our discussions, we often heard that those who started a completely new group or hired many new people during the pandemic were most affected by the lack of personal social interactions. Clinton Veale, for example, had just started a Royal Society-FLAIR fellowship in South Africa - a prestigious fellowship that allowed him to employ several Ph.D. students and postdocs. As a result, his group had just grown significantly bigger with a lot of new members when everything shut down. It felt almost impossible to build a group culture and integrate new group members when they did not know each other and were all working remotely. When everyone had to work remotely, several group members who went home to their families were dealing with significant personal issues, and it was difficult to maintain communication and support them. Although he was in the fortunate position of having a generous research budget, he had difficulty spending the funds within the funder's time frame due to supply chain problems. On the positive side, this time was a good lesson in managing expectations and goals and keeping things in perspective. Yuan Qiao adds that due to the pandemic, hiring has also been very difficult because of government restrictions, and turnover was a



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serious issue too. She concludes "Despite all the challenges, I have to focus on what I can control and simply carry on. It has not been easy, but I am glad that we now have a team of highly motivated and dedicated students and postdocs who are fun to work with. I look forward to coming to the lab to see our progress every day."

Mentoring and social interactions were not only an important topic for early career researchers, but also for many of our more established colleagues. Vishal Rai told us that all researchers were sent home during the lockdown in India and it was very challenging to keep the students motivated during the pandemic. He adds that in chemical biology, there is also a special training situation in which chemists are confronted with completely new techniques in biology, and vice versa. Interactions are therefore not only needed to increase knowledge, but also to build confidence. In his experience, personal contacts and individual one-on-one meetings to offer support for the students are therefore very important: *"They need to know that we are all in the same boat!"*

Vishal and his colleagues were not only concerned about their own students and postdocs, but also about the earlycareer researchers who had just started in their department. A few new Pls had just been hired when the pandemic hit. At this point, they had students, but their labs were still not ready to move into. Thanks to the strong culture of sharing resources in his department, these new groups and their Pls therefore started working in more established labs, reducing the impact of the pandemic on their careers. In retrospect, this not only helped them move forward with their projects but also fostered valuable connections within the department, which led to fruitful collaborations. Vishal adds that, in his group, the students themselves often lead the collaborations, and the contact between the students therefore had a strong impact on the success of a collaboration.

Along the same lines, Jennifer Heemstra told us that one of the significant transitions she was making during the pandemic was taking on more leadership roles. "This meant adding more work responsibility to my life simultaneously with trying to spend more time with my kids to help support their homeschooling. The pandemic made these leadership jobs tougher, as we had to keep everything running while also coping with massive changes such as classes moving online." Despite the challenges, she mentioned that it was a very illuminating time professionally, which helped her define her future goals: "I realized that engaging in this type of problem solving and supporting others through difficult situations aligned strongly with my skills and values, and this gave me greater clarity about my future career goals in academia."

While we mainly discussed this topic with colleagues in academic positions, we were also curious to hear about the transition from academia to industry, which is very common after the end of a Ph.D. or postdoc. Ingo Hartung told us that the cultural transition from academia to industry was very challenging for new hires during the pandemic. As a Ph.D. or postdoc in academia, everyone is roughly the same age and there are usually many social contacts. Industry is more heterogeneous with respect to the life and career stages of the employees, and adjusting to this work environment typically takes some time. He adds that some of his new colleagues had to start the majority of their first months with the company remotely, which "makes it incredibly difficult to become at home in the new environment". He adds that it now has become much easier again, as restrictions are lifted and they have regular social events such as joint lunches, department breakfasts, hiking days and soccer events.

Transferring Knowledge Using Virtual Formats

The mention of online conferences elicits an interesting mixture of positive and negative responses from the members of the Chemical Biology community that we have interacted with over the last few years. Some groan at the thought of more hours spent alone in front of a computer or waking up at 3 am to give a conference talk in an inconvenient time zone, and are now making up for the lost time in traveling and catching up with colleagues at in-person meetings. On the other hand, others found valuable learning opportunities and increased access to international speakers in online meetings, such as Stephen Hacker, who initiated the Munich-Leiden Virtual Chem-Bio Talks. Clinton Veale, based in South Africa, commented that online conferences increased access for researchers in more isolated regions to hear big-name speakers, but that he found watching a conference online for several days was less productive than short webinars or meetings with collaborators in small groups. Researchers in industry, who typically could only attend one or two conferences per year, also benefited from more open access to online conferences. Ingo Hartung attended about ten conferences on degraders and medicinal chemistry last year, nine of which were virtual. Others, however, did not attend any online conferences and relied on formerly established networks; rather waiting until travel was easier to go to in-person conferences (Emma Watson). Some of the skills needed to build a network also changed with online meetings. Johannes Karges, who appreciated joining virtual conferences and connecting with people all over the world via online platforms, commented that, "In an online conference, you can't rely on your labmates or PI to introduce you to people, you have to take the initiative yourself and contact people!"

Many agreed that virtual conferences and webinar series are a good way to transfer knowledge and explore topics outside one's own field, although it is more difficult to make personal connections and get feedback than in in-person meetings. It is also difficult to get hybrid conferences to work really well. In Vishal Rai's research group, all group members attended different online conferences and then shared in a lab meeting session on "what did we learn from the conferences that we attended?" As the barrier to participating was very low, they were also encouraged to attend conferences beyond their own areas of expertise. At a time when lab-work was delayed by lockdowns, group members were able to get a head start on learning about chemoproteomics – an area that the group now focuses on in their research. Online formats have also opened up more opportunities for Ph.D. candidates and postdocs to



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give talks, which can be a valuable channel for promoting their work in preparation for job applications (Ingo Hartung).

One of the positive outcomes of the pandemic was learning to communicate online more effectively and globally. Clinton Veale suggests that we extend this learning to our teaching methods as well, making use of new opportunities, for example by rethinking traditional models of exams, how we define cheating, etc. "The new generations of students are really smart, and we should encourage their creativity and digital skills, rather than restricting them." Both new and established faculty are still figuring out how to make online or hybrid teaching work well and be interactive and engaging. New faculty are learning this at the same time as learning how to teach (Emma Watson). Few received formal training, but the forced move to online teaching means that many of us are now able to do this. Although additional efforts are required to reach students from remote areas with poor internet access or with economically weaker backgrounds, the increased skills and lower barriers to creating online teaching content post-COVID offer broader access to students and many new opportunities (Vishal Rai).

Making Connections and Establishing Collaborations through Virtual Platforms

Many scientists are enjoying getting back to conferences and reconnecting with colleagues they have perhaps only seen via online platforms for the last two years (Figure 2). Those with well-established international networks likely have many invitations and communities to catch up with, while younger colleagues might have their first opportunity to attend an inperson scientific meeting. A frequent theme that comes up is whether these will have a longer-term influence on how we build and maintain connections in academia. We were therefore curious to learn more about the different digital formats as well as connections that were made during the pandemic. Especially in 2020, we witnessed an increase in activity on almost all social platforms amongst the chemistry and chemical biology com-



Figure 2. After numerous virtual meetings and phone calls, we finally met again in person at the European Symposium on Biological and Organic Chemistry (ESBOC) in 2022, in Gregynog, UK.

munity. Some people actively used these platforms even before the pandemic. Both Stephan Hacker and Ingo Hartung told us that social media activity did not change much for them over the past years. "I am obviously a Twitter nerd and was a fan of these types of interactions before. I now see a lot of colleagues on Twitter, LinkedIn... who were not there 3 years ago. I think the pandemic has contributed to this change", commented Ingo Hartung. He adds that Twitter is now more or less a standard communication channel and he now sees more and more colleagues from industry and academia at all career stages joining. As opposed to prepandemic times, Ingo Hartung and Vishal Rai conclude that the science community is now much more broadly represented online. "It was easy to attend conferences and to stay connected globally through virtual formats", adds Vishal Rai.

As the pandemic reduced or eliminated in-person interactions, some took the opportunity to use new channels for communication and setting up scientific collaborations. While established researchers could often rely on existing social and scientific networks, early-career scientists faced the challenge of building them without having the opportunity to meet in person. We, for example, had briefly met at the 8th Chemical Protein Synthesis Meeting in Berlin in 2019 and reconnected virtually shortly after the pandemic began to discuss formats to enhance online communication. Virtual scientific conferences were abundant a couple of months into the pandemic and offered valuable scientific content, however, we were mainly missing the personal exchange. We set up regular online meetings and also discussed these topics with various members of the peptide community and peptide societies. In the process of these conversations, we developed the idea of a virtual social hour that would have a similar feel to a coffee break at a conference - for short, informal conversations and networking. Teaming up with Wendy Hartsock, we launched the virtual peptide social hour in December 2020, which has connected peptide scientists at all career stages in industry, academia, and publishing from all around the world over the last few years. While we often see new faces during these socials, there are also many regular attendees, and we are excited that the virtual peptide social has become a regular event for so many of us.

Overall, the barrier to reach out to someone who you did not know before is now much lower. Ingo Hartung mentioned, "When you read a paper and you are interested in the topic or have a question, you just reach out to the author – this was much less common in the past!" Vishal Rai agrees that after the start of the pandemic, it was really easy to meet people on Twitter and to make new contacts. "We [Vishal, Anne, and Nina] all knew each other from Twitter before, which lowers the barrier to contact someone." While conducting our individual interviews, we also discovered that two of our interview partners had even met online and started a collaboration. In 2020, Vishal Rai's lab had just started working with chemoproteomics, and he therefore contacted Stephan Hacker, who he knew from online platforms. Since then, the two have been collaborating actively on chemoproteomics topics. Many collaborations in industry also started online during the pandemic (Ingo Hartung). Clinton Veale summarized that there were actually several positives



regarding online communications such as meeting international colleagues in a small group on a video call and even asks, 'Why didn't we do more of this before? The technology was there!'

Where Do We Go from Here?

The young faculty highlighted in this ChemBioTalents collection, and those we spoke with have made big career transitions and faced personal challenges during a unique time and set of circumstances. We have enjoyed hearing their stories and have been encouraged by the positive perspectives, learning experiences, and changed priorities we have heard. Nevertheless, many of us, and the broader community would rather forget about this time and are happy to have returned "back to normal". We therefore want to take the opportunity in closing this perspective to emphasize some of the inspiring ways that more established members of the community are deliberately thinking about how to apply some of the positive aspects going forward. We also end with a challenge and open question to the young faculty of the last few years represented here, and also to you, the broader community.

Responding from an industry perspective to our question about how to move forward, Ingo Hartung said, "This is an interesting topic, as we have spent quite some time in my MedChem department to establish what we call 'the post-Covid new normal'." They found that the pandemic brought some positive changes in the (industrial) work environment because it fundamentally changed how teams work and interact. For example, there is now a lot more flexibility with working on-site or from home; people are less bound to a location, which has many implications, especially for team members with young children. There is greater flexibility to individualize working times and arrangements as a result of a growing trust-based working culture within a highly motivated workforce. He says, "Our teams with their engagement brought us successfully through the pandemic, and the resulting higher level of flexibility and trust is part of the payback." To avoid a "two-class society" where lab-based team members must be on-site while officebased members may work from home, they encourage officebased staff to be on-site 60-70% of the time, to maintain the feeling of "being a team". Meetings are always in hybrid format at Merck, taking advantage of improved infrastructure and skills, which have also increased amongst non-industry partners.

"Maybe we should not forget about it [the pandemic] too much, because timelines are on the mind of many early career researchers", was a comment made by Vishal Rai that resonated with us. Gaining international experience, either during the Ph.D. or postdoc, or both, is desired for a faculty position in premier institutions in many places. Difficulties with traveling and family responsibilities, especially during the pandemic, might therefore have consequences down the track for earlierstage researchers who were not able to travel or got stuck overseas. We therefore challenge ourselves and other colleagues to not forget how the last few years might have impacted our younger colleagues – Ph.D. candidates and postdocs, and to consider how we can accommodate for their missed opportunities in training or getting international experience. On the other side, Vishal highlighted that there is an expectation for new faculty to work on ambitious projects, which take time, especially in the interdisciplinary chemical biology field. However, they still have to focus on publications, timelines and numbers, because that is what evaluators tend to look at. In Vishal's department, they often discuss science together and so the faculty always have a good idea of when progress is being made and who is working on ambitious projects. More established faculty can therefore have a significant role in shielding young faculty from evaluators who focus too much on numbers. In closing this perspective, we take a question Vishal raised, and throw it out to you, the community, "How can we make sure to account for the lost time of early career researchers?"

As we hope to have highlighted in this perspective, everyone experienced the pandemic in some way, but not everyone had the same experience. Both the positive and the negative consequences for all of us as a community will have follow-on effects over the next years that deserve thoughtful consideration and responses. During evaluations, young faculty can be hesitant to mention delays caused by pandemic disruptions, for fear of looking like they are complaining or making excuses. We therefore ask the community to hear the individual stories and not forget about the circumstances that have impacted so many of us.

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Conflict of Interest

The authors declare no conflict of interest.