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## Science & Society

### Mentoring during Uncertain Times

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**Scientific success is mainly supported by mentoring, which often occurs through face-to-face interactions. Changes to the research environment incurred by the Coronavirus 2019 (COVID-19) pandemic have necessitated mentorship adaptations. Here, we describe how mentors can broaden their mentorship to support trainee growth and provide reassurance about trainee development amid uncertain circumstances.**

#### How Can Uncertainty Impact Scientists?

The academic process is riddled with uncertainty (e.g., undefined graduation dates, yearly contract renewals for post-doctoral fellows, fluctuating research funding availability, manuscript review process, etc.), which can contribute to a sense of professional instability for scientists. Yet, conditions put forth by the COVID-19 pandemic have exacerbated damage to the academic pipeline, highlighting an array of inequities experienced by trainees [1]. For example, the quality of training a graduate student receives with reduced access to research resources may be diminished [2], which may negatively impact the career advancement of

mentees. Additionally, many international scientists are unable to secure jobs due to visa and travel restrictions, leading to gaps in employment. Furthermore, academic career trajectories changed for many post-doctoral fellows preparing to enter the academic job market, because several institutions have implemented hiring freezes or postponed active searches [3]. As the number of available faculty positions decreases, the unknown future of the academic job market has many mentees worried about their career plans or pursuing careers outside of academic science [4]. While these are just a few examples of how the pandemic has created a sense of uncertainty, we believe that mentors can make concerted efforts to provide mentees with training from afar to reassure mentees they are capable of achieving their goals despite the unprecedented circumstances.

The science pipeline has undergone substantial restructuring because of changes to the academic landscape prompted by the pandemic, such as funding freezes at the institutional level and reduced or limited access to research resources [5]. For example, early into the pandemic, restrictions at some institutions led to the termination of year-long experiments, loss of specialized animal lines, and lapses in research productivity with unclear prospects for the future. Given these circumstances, many scientists have a sense of fear about restarting expensive long-term experiments with potential restrictions looming. We recommend mentors and mentees carefully discuss the available options (e.g., alternative experimental approaches or contingency plans) to provide support during uncertain times and overcome fear of future pandemic-induced hinderances to research objectives.

As a result of the pandemic, timely adaptations in mentorship are needed to guide trainees toward success. We believe mentees and mentors should have open conversations about the myriad complexities

regarding the scientific process made apparent during the pandemic, with realistic expectations for overall well-being and research productivity backed by sensible experimental design. Good-quality mentorship can have an enormous impact on a mentee's career by facilitating personal and professional growth, developing/expanding one's network, and providing sponsorship (financial support or invitation) for various opportunities [6,7]. However, traditional mentoring landscapes have been upended by the COVID-19 global pandemic; as a result, virtual mentoring is gaining popularity [7].

#### How Can Virtual Mentors Leverage Technological Advances?

Virtual mentoring during the COVID-19 pandemic has capitalized on increased options for video conferencing, allowing mentors to be accessible to mentees amid restrictions on in-person social activities [7]. However, video conferencing is not possible for all mentoring relationships: although the digital divide has narrowed, 25% of adults do not have broadband internet access at home and this divide is exacerbated in minoritized households<sup>1</sup>. As formal mentoring programs geared toward minoritized trainees effectively increase the retention of students through graduation [8], mentors who recognize this digital disparity are well positioned to provide mentoring opportunities to promote diversity in science, technology, engineering and mathematics (STEM). Mentors who seek to reach mentees without access to video conferencing can embrace traditional communication approaches that do not require high-speed internet. As such, we recommend mentors do not rely solely on one form of communication for all mentees and instead evaluate how different tools (e.g., phone calls, email, or online mentoring platforms) may support the needs of each mentee. Finally, we encourage mentees and mentors to take advantage of online activities, such as symposia, conferences, and workshops

designed to support scientific and career development and build community (Box 1).

Undoubtedly, the requirement for virtual performance reviews at key career transitions has generated a sense of uncertainty for mentees. Mentors can provide support by helping mentees develop a virtual skillset to tackle online qualifying exams, thesis defenses, interviews, and chalk talks. As the global business, education, and technology sectors have utilized video conferencing to facilitate collaboration and reduce travel, conceptual frameworks for developing educational videos [9] and project pitches are available for mentors and mentees to integrate into a virtual skills development plan. While some traditional STEM mentors may be reluctant to embrace virtual learning [10], mentees may also consider identifying a mentor outside of STEM who espouses the benefits of virtual learning and communication to receive supplemental mentorship.

The requirement for science to advance outside of physical spaces has sparked creative approaches to virtual scientific communication and research. Mentors

have the unique opportunity to support mentee growth with resources that were previously unavailable or unaccommodating to early-career scientists. Foremost are new ways to expand scientific networks. The increased accessibility to global conferences on virtual platforms is unmistakable: virtual scientific meetings have democratized attendance across trainee levels globally with reduced cost of attendance and unrequired travel funding [11]. Social media networks, such as Twitter, provide informal opportunities to initiate mentorship relationships without the requirement for traditional in-person networks and allow mentees to engage in issues pertinent to science and society (e.g., diversity and inclusion in science) [7].

Equally significant is a newfound appreciation for computational research, which has enabled quarantined scientists to conduct research remotely. During 2020, the 30-year anniversary of the signing of the Americans with Disabilities Act (ADA) into law, many institutions were mindfully incorporating technology to facilitate research and teaching for which disabled

and minoritized scientists have long advocated [12]. Mentors who leverage new technology emerging during the COVID-19 pandemic (e.g., captioning<sup>ii,iii,iv</sup>, digital notetaking<sup>v,vi,vii,viii,ix,x,xi</sup>, audio descriptions, and transcripts<sup>xii,xiii</sup>) to enhance virtual mentoring sessions, have the opportunity to establish truly inclusive mentorship practices that persist beyond the current challenging times.

### How Can Virtual Mentors Provide Reassurance during Challenging Circumstances?

During these unorthodox and challenging times, we believe mentees need commitment, support, and agency from mentors more than ever. Mentor commitment is the art of being dedicated to your trainee's growth, success, and career trajectory, but we believe it is also necessary to ensure your mentee's mental health concerns are properly addressed, especially during the current pandemic. Given that mentors may not fully know the circumstances a mentee may be experiencing, genuinely checking in on their well-being can save a life or a career. While we understand mentors may not have adequate training in emotional and mental health to address mentee issues directly, we suggest that mentors may connect mentees with resources available at their institutions to provide additional support as needed. Furthermore, we recommend mentors take advantage of resources directed toward emotional intelligence (EQ) to extend their knowledge base regarding this topic, while also sharing these resources with their mentees to promote self-learning\* [13–18]<sup>xiv,xv,xvi</sup>.

Additionally, by providing resources to enable mentees to support their well-being and emotional health, mentors will likely

#### Box 1. Adapting Scientific Training by Leveraging Virtual Opportunities

The COVID-19 pandemic has uprooted many scientists from the natural laboratory environment. Amid these circumstances, we have taken advantage of virtual meetings and other forms of supplementary training and professional development activities to enable our personal and scientific development during unfamiliar working conditions. Virtual meeting formats have reduced logistical barriers to meeting attendance: travel funding is not required, and virtual presence enables participation at otherwise tightly scheduled meetings. We particularly call to attention the potential for these virtual meetings to diversify science by highlighting and promoting the exceptional research contributions of minoritized scientists.

Furthermore, many virtual meetings, such as the 2020 American Society for Cell Biology (ASCB), the Society for the Advancement of Chicanos and Native American Scientists (SACNAS), and the American Society of Hematology (ASH) Annual Meetings, embedded an option for networking or scheduling one-on-one meetings between scientists. This networking opportunity circumvents the often-random interactions that occur during in-person meetings, and allows mentees to take control of their mentoring experience by directing interactions. Finally, the chat option at virtual meetings supports a more inclusive form of question and answer sessions, whereby all scientists are encouraged to ask questions without a hierarchy for whose question is asked to the speaker. We believe these characteristics of virtual meetings have transformed how mentees can use technology to leverage their training during challenging circumstances.

Taken together, virtual conferences provide an avenue to further enhance scientific communication. There are several models of how virtual conferences and mentors can leverage technological advances to support scientific and professional development. For example, similar programming targeting scientists aiming for careers in biotechnology, scientific communication, and scientific writing could be helpful for supporting these career transitions. As such, we challenge institutions, societies, and organizations to develop creative programming and activities in the future that leverage technology to support scientists at various career stages with access to mentoring and community-building activities.

\* Talon has overtaken Voicocode as the main voice coding platform. A thorough presentation on Voice coding is available through the GitHub of Harold Pimentel, interviewed in Nowogrodzki's piece: <https://github.com/pimentel/amputeecoalition2018>

also benefit. For example, in our experience, mentees who feel valued beyond their productivity levels are eager to produce fruit, which leads to more discoveries. In the absence of such support and appreciation, damage to the academic pipeline may be further exacerbated. We believe that such damage may disproportionately impact mentees in vulnerable positions, including Persons Excluded because of Ethnicity or Race (PEERs) [19], individuals with disabilities, women, and beyond [1].

Many trainees are currently in a state of physical and mental isolation due to the unforeseen future and uncertain circumstances, such as limited access to resources, financial hardships, and shifting family dynamics. Therefore, it is imperative to regularly check-in with mentees about their well-being, show empathy, and address their concerns with transparency. However, not all individuals will respond positively toward wellness check-ins, because they may not be accustomed to this type of mentoring relationship. If a person is not receptive to this gesture, the best resolution is to give the individual personal space and check-in periodically. There is a possibility they may refuse your hospitality, but your efforts will be acknowledged. We encourage mentors to take advantage of wellness check-ins, which may be as simple as a virtual coffee hour or as elaborate as a virtual laboratory social events; both are dynamic to build and sustain the morale of your research group. In addition to formal mentoring, we have found immense value in generating virtual networks of peer and near-peer mentors, which we encourage scientists to explore as potential mechanisms of building community to support wellness and productivity amidst uncertain circumstances (Box 2).

Working from home during the pandemic can impact one's work–life balance [20], which redistributes and alters how your time, as a mentor, is allocated during a

### Box 2. Overcoming Physical and Mental Isolation by Creating a Virtual Community

In early 2020, a group of PEER [19] scientists came together to combat physical and mental isolation by creating a virtual community. This group, referred to as the community of scholars, bonded through a common passion for advancing scientific discovery and innovating Diversity, Equity, and Inclusion (DEI) initiatives<sup>xvii</sup>. The members met regularly to discuss strategies to:

- bolster and increase diversity in science;
- promote the retention of scientists in the academic pipeline;
- broaden academic and industrial awareness of diversity and inclusion;
- illustrate how to foster professional and career development of PEERs; and
- collaborate to enhance scientific discoveries.

This mentoring group also serves as a safe virtual space to transparently share emotions and struggles amid uncertain circumstances, such as protests and civil unrest, political occurrences, and healthcare disparities; and as a peer-mentoring network for scientists to receive guidance as they enter the job market and prepare for advanced scientific careers.

The community of scholars is committed to developing and promoting professional scientists from all backgrounds, with a particular focus on those excluded based upon ethnicity/race, gender, LGBTQ status, ability/disability status, first-generation status, socioeconomic status, and beyond. However, this group of scientists comprises individuals who draw from different leadership styles, varying levels of emotional intelligence, and unique communication forms to advance a set of common goals. As such, it is important to set boundaries and expectations to ensure all members of the community are respected and valued.

Through embracing community, the members made a dynamic impact on the larger scientific community during uncertain times. Although these scientists were physically separated, they felt less isolated when working on these endeavors. This type of community fosters encouragement, support, and strength during one of the darkest times of our history. A year later, members are still paying it forward to inspire the next generation of scientists, while conquering new academe terrain as rising assistant professors. Therefore, this community is indeed better together, not only in-person, but also through virtual realms.

It is our hope that this virtual community can be modeled to help other scientists who may be struggling amid uncertain circumstances. Furthermore, this form of virtual networking has led to several blog posts, publications, and joint seminars, demonstrating the power of virtual community building in supporting productivity.

traditional workday. We suggest mentors vocalize these challenges to their mentees to reveal they too can be overwhelmed by juggling multiple responsibilities. If you are unable to commit time to your mentees, we suggest mentors find ways to provide resources and guidance to mentees. For example, mentors may suggest mentees enroll in mentoring network programs, connect mentees to a peer mentor, or provide mentees with access to wellness resources. We suggest utilizing EQ [21] to assess the personal needs and well-being of mentees. Displaying commitment to your mentees can make the world of a difference and keep your research group's edge during these challenging times.

### Concluding Remarks

People have lost loved ones, time, data, motivation, ambition, and much more due

to the COVID-19 pandemic. Successful virtual mentoring through clear, responsive, and respectful communication has the potential to build a mentee's motivation. In addition, virtual mentoring can provide access to resources to sustain the mentor–mentee relationship during trying and uncertain times. We suggest that mentors encourage their senior mentees to support junior trainees during these challenging circumstances. We encourage mentors to plant seeds of positivity within their lab, because this gesture can go far to inspire the entire group. Raising the morale of one's mentees may be difficult when one's own morale and gumption are lacking, but, as mentors, we must remember to be the light and example for our mentees and provide guidance and reassurance during these uncertain times.

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## Declaration of Interests

The authors have no interests to declare.

## Resources

- <sup>i</sup>[www.pewresearch.org/internet/fact-sheet/internet-broadband/](http://www.pewresearch.org/internet/fact-sheet/internet-broadband/)
- <sup>ii</sup><https://vitac.com/zoom-closed-captioning/>
- <sup>iii</sup><https://otter.ai/login>
- <sup>iv</sup><https://verbit.ai/verbit-announces-new-integration-with-zoom/>
- <sup>v</sup><https://us.livescribe.com/>
- <sup>vi</sup>[www.gingerlabs.com/](http://www.gingerlabs.com/)
- <sup>vii</sup><https://evernote.com/>
- <sup>viii</sup>[www.notetalker.com/us/](http://www.notetalker.com/us/)
- <sup>ix</sup>[www.sonocent.com/](http://www.sonocent.com/)
- <sup>x</sup>[www.microsoft.com/en-us/microsoft-365/onenote/digital-note-taking-app](http://www.microsoft.com/en-us/microsoft-365/onenote/digital-note-taking-app)
- <sup>xi</sup>[www.3playmedia.com](http://www.3playmedia.com)
- <sup>xii</sup>[www.acb.org/acp/services.html](http://www.acb.org/acp/services.html)
- <sup>xiii</sup>[www.w3.org/WAI/media/av/description/#integrated-creating-integrated-description](http://www.w3.org/WAI/media/av/description/#integrated-creating-integrated-description)
- <sup>xiv</sup>[www.mindtools.com/pages/article/newLDR\\_45.htm](http://www.mindtools.com/pages/article/newLDR_45.htm)
- <sup>xv</sup>[www.verywellmind.com/what-is-emotional-intelligence-2795423](http://www.verywellmind.com/what-is-emotional-intelligence-2795423)
- <sup>xvi</sup>[www.forbes.com/sites/travisbradberry/2014/01/09/emotional-intelligence/?sh=e60cdeb1ac0e](http://www.forbes.com/sites/travisbradberry/2014/01/09/emotional-intelligence/?sh=e60cdeb1ac0e)
- <sup>xvii</sup><https://twitter.com/CommOfScholars>

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## Spotlight

# Maestro of the SereNAde: SLC25A51 Orchestrates Mitochondrial NAD<sup>+</sup>

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Recently, three groups, Girardi *et al.*, Kory *et al.*, and Luongo *et al.*, independently identified solute carrier (SLC) 25A51 as the long-sought, major mitochondrial NAD<sup>+</sup> transporter in mammalian cells. These studies not only deorphan an uncharacterized transporter of the SLC25A family, but also shed light on other aspects of NAD<sup>+</sup> biology.

Metabolite transporters mediate the import and export of metabolites, either across the plasma membrane or between membrane-bound compartments. These membrane barriers are essential to maintain separate environments and nutrient pools that perform various metabolic functions. Functional characterization of metabolite transporters has been challenging due to the technical difficulties associated with identifying their substrate (s). Generally, the gold standard method is to reconstitute the transporter into