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Scientific Life

Building a laboratory and networks during the COVID-19 pandemic

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The coronavirus disease 2019 (COVID-19) pandemic has created unprecedented obstacles for new investigators to traverse. The pandemic's impact exacerbates inequities for groups historically excluded from science. We provide recommendations to support junior faculty, including women and faculty from groups historically excluded from science, in establishing laboratories during the pandemic and foreseeable future.

Setting up your research program

New junior faculty must plan for pandemic-specific setbacks. During negotiations, inquire how the institution has fared through COVID-related financial disruptions and what, if any, provisions are in place to support faculty success despite pandemic-specific challenges. For example, has student or staff recruitment been impacted? Do provisions exist for extending tenure clocks?

Additional pandemic-induced obstacles to consider are supply chain shortages and hybrid work environments. Disrupted supply chains impact the ability to renovate laboratory space and to equip the laboratory with the instruments, reagents, and organisms needed to perform experiments [1]. Because pandemic-induced personnel shortages lengthened time needed for facilities requests and renovations and increased the price of building

materials, it is necessary to clarify in detail the physical features of your space. Are renovations needed? If so, who will pay, and can they be completed before your start date? Does the lab and office come with furniture (desks, chairs, etc.)? Is there common cold storage available? When can you access startup funds and who will help with purchasing? Knowing this information will allow you to circumvent pandemic-induced delays in establishing a lab. Furniture, cold storage units, and plastic consumables are essential items now difficult to source; indeed, they can take upwards of 6 months for delivery. If possible, order these items before your start date or soon thereafter. We also recommend bulk ordering consistently backordered plastics (e.g., pipette tips, conical and PCR tubes, etc.). Consider ordering all reagents necessary for experiments planned during the first 6 months. Do not assume items like gloves, molecular biology reagents, or ultrapure water will be easily acquired, as these have become scarce since the pandemic. Because supply chain delays will likely remain, incoming new faculty must prepare for this obstacle.

New challenges in building a research team during the pandemic include reduced recruitment ability and hybrid laboratory environments that new investigators have found difficult to traverse [2]. Recruiting quality candidates has become increasingly difficult for several reasons. Travel restrictions, COVID-19 policies, and embassy closures have made visas difficult to obtain for international talent. Domestically, graduate students have delayed graduation dates and the COVID-induced boom in biotechnology attracts qualified PhD level scientists with higher pay.

Hybrid work presents further challenges to building a research team as virtual recruitment activities for trainees render networking difficult. Therefore, we recommend initiating recruitment soon after you have an offer. This can be informal, over

social media, or by formally posting a job advertisement. Often, you will only meet new lab members after they have accepted the position. Therefore, it is prudent to have senior mentors in your network interview prospective lab members. Because of hybrid work, invest in infrastructure for the lab (Table 1). Though initially time intensive, a well-organized laboratory will provide enhanced communication and efficient workflows that will persist beyond the pandemic.

Building relationships

As a new group leader, establishing relationships with your superiors and colleagues is crucial for successfully integrating into the division, department, and institution. Most relationships become established in informal environments, including causal hallway conversations, faculty meetings, or graduate program events. However, the pandemic has made it more difficult for junior faculty to integrate into new institutions. Labs are still sparse with employees. Random interactions are much less likely with hybrid work and most events take place online. However, there are ways new faculty can facilitate their integration into the environment. Do not be afraid to set up one-on-one virtual meetings with potential collaborators. If not required by your institution, create a mentoring committee consisting of senior and near-peer mentors. Senior mentors can provide guidance on your transition to promotion/tenure, and near-peer mentors can help you tackle immediate challenges related to your new role. Support and advice from junior faculty who recently navigated your institutional landscape are an invaluable resource and community.

Building relationships outside of your institution is crucial to generate national and international research presence, which is commonly required for tenure/promotion. Often, new faculty are establishing themselves within new fields as they distinguish themselves from former

Table 1. Resources for establishing laboratory infrastructure

Infrastructure	Considerations	Applications/resources
Data management	<ul style="list-style-type: none"> • What type of security will you need for your data? • Who in your lab will manage access to data? How should files be named or annotated? • Will you need file sharing between users? • Do you need both online and offline access? • Do you need a cloud-based access forum? • What is your budget? 	<ul style="list-style-type: none"> • Online options: Box, OneDrive, Dropbox, Google Drive • Offline options: lab shared drive, Synology solutions
Laboratory notebooks	<ul style="list-style-type: none"> • What type of security will you need for your online colony data? • Who will manage and maintain access to lab notebooks? How frequently will notebooks be exported? • Will you need file sharing between users? • Do you need both online and offline access? • What is your budget? • What types of files do you need to integrate into your notebook? (i.e., images of gels, plasmid maps) • How stable is the company? 	<ul style="list-style-type: none"> • LabArchives • Benchling
Inventories	<ul style="list-style-type: none"> • Who will perform training for using the software? (i.e., company rep, lab manager) • Who in your lab will be the main point of contact for maintaining this software? • How many applications would you use for inventory maintenance? (i.e., mouse colony, equipment, plasmid library, consumables stocks) • Can items be barcoded? What information should be included in their description? (i.e., catalog number, vendor, genetic background) 	<ul style="list-style-type: none"> • Quartyz • GenoFab • Transnetyx • Softmouse • MLIMS • Google Sheets • Bookkit
Communication	<ul style="list-style-type: none"> • How would you like your lab members to communicate about everyday lab-related topics? (i.e., equipment issues, animal health checks, backordered items) • How should your lab communicate regarding recurring events? (i.e., one-on-one meetings, lab meetings, departmental seminars) 	<ul style="list-style-type: none"> • Slack • GroupMe • Microsoft Teams • WhatsApp • Email
Project management	<ul style="list-style-type: none"> • Who will manage access to lab projects? • How will you use project management software relative to other existing infrastructure? (i.e., how would one combine Trello with Google Calendar) 	<ul style="list-style-type: none"> • Trello • Microsoft Teams • GenoFab • OneNote • Google Calendar

mentors. Conferences are an opportunity to present your research and network, while virtual conferences have become an increasingly common venue for these activities [3]. If the virtual conference platform allows, junior faculty should set up one-on-one meetings with conference attendees with whom you hope to connect. Additionally, if you have meaningful interactions during a session, send follow-up emails to remain connected. This seemingly small gesture can result in major collaborations or sharing of important resources.

Beyond scientific relationships, establishing mentoring relationships has been complicated by the pandemic. As new faculty members, we find Twitter to be a useful platform for mentorship, often in an informal, yet efficient manner [4]. New faculty can tweet requesting advice, which in our experience has led to an outpouring of

support, clever ideas, and resources. Twitter is also useful for effectively sharing information to a broad network. For example, this crowdsourced approach has increased information sharing about reagent shortages and equipment backorders, which enabled us to investigate suggested alternatives. Twitter also offers an opportunity to form an online community between scientists with shared identities and scientific interests to create networks integral to managing the increased emotional toll of the pandemic. While navigating the transition from postdoctoral fellow to junior faculty, new faculty must also support trainees whose personal lives and career plans have been impacted by the pandemic. In our experience, support, especially through Twitter, has made us feel less isolated while we endure the added emotional labor of starting a lab during a pandemic. During the pandemic and

beyond, we recommend junior faculty use Twitter to make connections that may otherwise be impossible to create (i.e., @500womensci, @BlackInBiophys, @BlackInImmuno, @LatinxInSTEM).

Supporting diverse junior faculty

Exposure of systemic racism in the USA during the COVID-19 pandemic revealed the importance of supporting diverse junior faculty. Pressures faced by new principal investigators are compounded for individuals from groups historically excluded from science and women faculty. Sadly, the COVID-19 pandemic and coinciding urgency for social reform has exacerbated existing disparities. These disparities include increased demand for service on committees, household and caregiving responsibilities for women, and lack of mentorship and sponsorship [5,6]. To ensure we do not lose a generation of

diverse faculty, we suggest new group leaders only commit to activities aligning with established priorities. Before responding to committee service requests, evaluate if the request is mutually beneficial. Will the activity support tenure and promotion? Is this something you care about and want to do? Does the activity advance your career or personal well-being? Do you have the expertise, time, and capacity to do the activity well? If no, politely decline or, if needed, ask your chair or other mentors to support you in saying no to service that may take time needed for other important activities and ultimately derail your success. For activities you agree to, do not be afraid to request compensation for your contributions (teaching relief, effort towards salary, honorariums, or resources to accomplish said task).

Often, the burden of childcare or elder parent care falls on women, which has led to significant deficits in productivity over the course of the pandemic [7–11]. Shortages in childcare and school closures during the pandemic have impacted the ability of those with children to maintain the same level of productivity as their peers. New faculty should ask what departmental guidelines and policies have been revised to support attaining tenure considering disruptions due to the pandemic (i.e., number of papers published, grant support, service, teaching).

Increases in the cost of living due to the pandemic threaten to derail recruitment of faculty from groups historically excluded from science [5]. Under-represented minority scientists are more likely to be under-resourced financially and therefore disproportionately impacted by unsustainable financial hardship from the pandemic, such as loss of spousal income, increased cost of living, and lack of affordable

housing. We recommend incoming faculty, especially under-represented minorities, negotiate for resources that can offset financial hardship. Because of the existing pay disparities for women and under-represented minorities, ensure your base salary is commensurate with other incoming faculty [12]. Determine if there are programs to support housing, childcare, and relocation, and ensure these financial resources are detailed in your offer letter.

Call to action: to department chairs and administration

New faculty require institutional support to successfully set up a lab in the era of COVID-19. We recommend department chairs and senior colleagues ask new hires if they are having difficulty obtaining any supplies, which may be in stock in other laboratories. This act of collegiality can provide junior faculty with a sense of community and build trust and confidence as they are navigating a new institution. We also advise institutional leaders to review current support for caregiving, especially for women of color disproportionately impacted by the pandemic [9], and ensure new hires are compensated fairly. Lastly, because access to appropriate mentorship is an important predictor of success for junior faculty, departments should establish a formal mentoring program for junior faculty or commit monetary resources for external mentoring or coaching.

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