Title

What I Wished I Knew When Starting As a Professor: An Interview with Robert Abramovitch, Lark Coffey, Thomas Kehl-Fie, and Rita Tamayo

Journal

Trends in Microbiology, 25(7)

ISSN

0966-842X

Authors

Abramovitch, Robert

Coffey, Lark

Kehl-Fie, Thomas

et al.

Publication Date

2017-07-01

DOI

10.1016/j.tim.2017.04.008

AUTHOR QUERY FORM

ELSEVIER	**Journal:** TIMI **Article Number:** 1455	**Please e-mail your responses and any corrections to:** **E-mail:**

Dear Author,

Please check your proof carefully and mark all corrections at the appropriate place in the proof (e.g., by using on-screen annotation in the PDF file) or compile them in a separate list. Note: if you opt to annotate the file with software other than Adobe Reader then please also highlight the appropriate place in the PDF file. To ensure fast publication of your paper please return your corrections within 48 hours.

For correction or revision of any artwork, please consult http://www.elsevier.com/artworkinstructions.

Please note that the figure resolution in these proofs is lower than the original figures to avoid problems with emailing large file sizes. The figure resolution in the final publication will be equivalent to the original figure submission.
Any queries or remarks that have arisen during the processing of your manuscript are listed below and highlighted by flags in the proof. Click on the 'Q' link to go to the location in the proof.

Location in article	Query / Remark: click on the Q link to go Please insert your reply or correction at the corresponding line in the proof
Q1	"..... and pursing investigations that will....." pursuing ? Please check this box or indicate your approval if you have no corrections to make to the PDF file ☐

Thank you for your assistance.

TrendsTalk

What I Wished I Knew When Starting as a Professor: An Interview with Robert Abramovitch, Lark Coffey, Thomas Kehl-Fie, and Rita Tamayo

A career in science often feels like a series of steps. These are sometimes circular, for example, the loop of building a hypothesis, designing experiments, applying for and receiving funding, doing research, and publishing research. Or these can be the steps in a career progression from performing PhD research, writing and defending a dissertation, to finding a postdoctoral fellowship, and then exploring next steps which can include looking for a professorship. But there are relatively few tenure track assistant professor positions for the many candidates that apply, and securing that first position can loom large. We were curious what happened next after reaching the step of being a professor in terms of what the early years of being a professor and principal investigator (PI) were like especially in the current challenging funding climate. To delve into this further we talked with four investigators about what they wished they knew during their first years as a PI. Robert Abramovitch is an Assistant Professor in the Department of Microbiology and Molecular Genetics at Michigan State University. His laboratory studies the molecular mechanisms by which the pathogen *Mycobacterium tuberculosis* senses and adapts to host immune cues. His laboratory also conducts academic drug discovery with the goal of identifying small molecules that interfere with *M. tuberculosis* virulence and persistence. Lark L. Coffey, PhD, is an Assistant Professor in the Department of Pathology, Microbiology, and Immunology at the University of California, Davis, School of Veterinary Medicine. Dr Coffey is a virologist who studies the ecology and evolution of mosquito-borne viruses, including Zika, chikungunya, West Nile and St Louis encephalitis that are a significant cause of human disease with no licensed vaccines or treatment beyond palliative care. The goal of her research is to understand patterns of viral molecular evolution and the viral genetic factors that promote emergence and severe disease. Outside of work, she enjoys traveling with her husband and 3-year-old son. Dr Thomas Kehl-Fie has been an Assistant Professor in the Department of Microbiology at the University of Illinois at Urbana-Champaign since 2013. His laboratory is interested in elucidating how pathogens, despite being starved for essential nutrients by the host, remain capable of causing infection. Prior to his current position, he was a postdoctoral fellow at Vanderbilt University and a graduate student at Washington University in St Louis. Rita Tamayo, PhD, is an Associate Professor in the Department of Microbiology and Immunology at the University of North Carolina at Chapel Hill, USA. Her laboratory studies mechanisms of virulence gene regulation in the bacterial intestinal pathogens *Clostridium difficile* and *Vibrio cholerae*.

What was the most surprising thing that you learned as an early PI?

Lark Coffey (LC): I naively thought I would be reading and thinking about science all day long. By contrast, I spend much of my time facilitating doing science. I ensure smooth research operations by guaranteeing my staff have training and access to the high containment facilities where we work with pathogenic viruses as well as the appropriate IACUC approvals for work involving vertebrate animals. I grossly underestimated the time and effort these logistical steps would take!

Rita Tamayo (RT): I was definitely surprised by just how little time I have to read and think about science as a PI, compared to when I was a PhD student or postdoc. As my laboratory grew and there were increasing demands on my time, it definitely became an issue. It was so easy for bench work, mentoring, teaching, and myriad meetings to fill up my schedule. I had been advised that I would need to protect time for writing, but it turns out I have had to do the same for reading the literature and planning out projects. Despite scheduling time for this each week, I still fall behind and end up having to intensively catch up when I'm writing a paper or grant application. Even now, most of what I read is more directly relevant to my research. What I read for fun outside of my immediate areas of expertise I come across on Twitter or a journal club, whereas I used to comb through journal tables of contents.

Thomas Kehl-Fie (TKF): As both a graduate student and postdoctoral fellow, I was fortunate to work in dynamic environments where, over coffee or lunch, there was a near constant exchange of ideas. Early on, I was surprised to the extent that being a PI isolated me from that free-flowing exchange of ideas.

Robert Abramovitch (RA): For me, the most surprising aspect of being a new PI was needing to develop new approaches to managing and focusing my attention. As a PI, there are varied demands on my attention, and switching between the responsibilities can be intellectually taxing. In a given day, I might find myself discussing a project with a student, dealing with administrative issues, working on a committee, responding to an urgent e-mail, preparing a lecture or even trying to get into the laboratory and conduct an experiment of my own. The time management skills I had developed as a bench scientist were not enough to adjust to this kind of multitasking. I've now developed some new attention management skills to help me work effectively on the diverse responsibilities that come with being a PI.

What was a mistake that you made as a young PI that you regret?

RT: I think the biggest mistake that I made when getting started was being conservative in spending my start-up funds. You really do need to invest in your research, especially in your trainees and employees, in order to publish and get funding. There were projects that I should have invested in sooner rather than later, but I thought that I should make my funds last. I also wasted a few weeks trying to get the best deals on equipment and reagents, when I should have just bought what I needed and started my experiments. I have made plenty of other mistakes, but fortunately none that I have regretted long term. Seeking mentorship and guidance at my institution, from established faculty as well as faculty just a little ahead of me on the tenure-track, has helped me avoid many pitfalls. I have also gained a lot of insight from blogs focused on science careers, as they foster discussion of relevant topics that I perhaps hadn't considered. Together, these helped me decide how to prioritize my obligations, whether to take on certain committee work, how to handle personnel issues, and more.

LC: My initial grant applications were for smaller awards. A faculty mentor pointed out that preparing for small grants was taking me nearly the same amount of time that I could instead be devoting to grants with larger payouts. Following her advice, I now weigh the effort required to monetary payoff for each grant application I consider, which allows a more strategic approach to the time I allocate for applications.

RA: In retrospect, I wish I had grown my laboratory team more aggressively in the early years. I think I was overly conservative in taking on new trainees, because I was concerned about having sufficient long-term funding. However, as a new PI, I think it is important to work on the optimistic assumption that long-term funding will eventually be secured.

TKF: Upon starting my position, I established a joint laboratory meeting with a senior member of my department to ensure that my students would receive diverse suggestions regarding their projects and have an additional resource they could call upon as they navigated graduate school. While this meeting has been incredibly beneficial, I regret that early on I did not also set up an independent laboratory meeting that would offer my students an opportunity to talk more frequently about their projects in a more informal setting.

What have you found to be an effective tactic in approaching grant writing?

RA: Start early! I generally try to start writing a grant about 3 months before it is due, with the goal of having a relatively complete draft 6 weeks before it is due. This provides plenty of time for colleagues to read the grant and provide feedback. Finding a quiet place to write with few distractions is also essential.

RT: I don't effectively switch between grant writing and other tasks. So for me, once I'm ready to seriously plan and write a proposal, I have to block a few hours of time, for a few days each week, on my calendar. I then sequester myself somewhere (my office with the door closed, the library, a coffee shop) to read the relevant literature, develop my research aims, and start writing. I definitely get feedback on my research plan from colleagues and people in my own laboratory. At this point almost all of my applications go to one funding body, so I have a general formula for how I structure my proposals and the writing phase isn't as brutal. I requested examples of successful applications from colleagues to get a sense of the structures and the level of detail that work. Finally, I always have at least one person read a nearly-finished draft to get input on the writing and logical flow and to help catch typos I inevitably miss. A challenge that I still face is in deciding when is the right time to publish data versus including it in a proposal, but I'm not sure there is a right answer to that.

TKF: Finding blocks of time to write has been a challenge due to the tendency of things that demand my attention to appear. To overcome this issue, I have placed standing 'meetings' with my grants on my calendar.

LC: As a young PI at a multidisciplinary institution with many collaborative opportunities, I am inclined to pursue too many new ideas, some of which are distant from my specific expertise and interests. The best grant-writing tactic I have found is to stay true to my central research focus. This allows me to build on my established skill set. Also, I do not work best at the last minute. I finish a draft of the grant in advance of the deadline so that other scientists can provide feedback to improve it.

From your vantage point now, what changes could be made in the scientific enterprise that would have helped you as a beginning PI?

TKF: Some of the most interesting scientific questions are being addressed through collaborative science and there is an increasing push for interdisciplinary investigations. However, a tendency to discount the contributions of each individual in collaborative works still exists. While it is important that an early career PI demonstrates independence, the current mindset can at times force one to choose between doing the most exciting science and pursing investigations that will demonstrate independence. Q1

RT: In addition to the obvious boon of increased funding for basic research, a fundamental change that would make a tremendous impact is wider acceptance of staff scientists in academic

laboratories. As a PI, you're basically running a small business, soliciting funds to pay your employees (trainees) and do the work (research). Businesses highly value 'middle management' positions, and in a laboratory this person would perform research, oversee some of the day-to-day activities, help train new people, and assist with administrative tasks, freeing up the PI's time to write grants. As a new PI, you're more likely to start a laboratory with a technician, and maybe a graduate student or two. They may be really talented, but it takes time for them to build experience and expertise. A staff scientist would justifiably merit a higher salary than a postdoc, but a postdoc brings additional concerns. For example, a PI should consider the needs of a postdoc with their sights on an academic research career, such as ensuring that they have the potential for an independent project on which they could build their own laboratory. That wouldn't be an issue with a staff scientist. Having a highly skilled staff scientist employed would get a laboratory off to a strong start. I'm hoping that NIH funding mechanisms like the R50, which support Research Specialists, become instated by more Institutes.

RA: New PIs should be provided with as much input and support as possible into what makes a grant proposal successful. Innovative ideas and exciting science are of course essential but not always enough in today's funding climate. This support could take the form of grant-writing workshops, peer writing groups, professional grant-writing support, and opportunities to observe peer review study sections. When this kind of support is available at the institution, new PIs should be actively encouraged to take part.

LC: My experience as a new PI has been extremely positive. So positive, in fact, that I cannot target major changes I would make to the scientific enterprise. I attribute much of my positive experience to the supportive environment I have been welcomed into, which includes a university community that wants me to succeed, as well as a dedicated faculty mentoring committee that I go to with questions from hiring to finding a work–life balance. I also found the book *Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty*, published by the Burroughs Wellcome Fund and the Howard Hughes Medical Institute, an incredibly useful reference.

Is there any training (scientific or nonscientific) you feel would have better prepared you to be a PI?

TKF: The current training system has been refined over the years to produce individuals with exceptional research acumen. However, being an excellent investigator is only one of the skill sets necessary to run a successful research program. In the current challenging funding environment, bad business or financial decisions can be as detrimental as poor scientific choices. However, even with the recently increased focus on career development, little attention is given to the practical skills associated with running what is functionally an independent small business.

LC: As a student and postdoctoral fellow, I never managed more than the small pot of funds allocated to my individual projects. I would have greatly benefitted from training in managing monies, including for multiple projects and accounting for cost inflation of reagents and supplies, as well as budgeting for employee salaries. Now that I employ other scientists, I want to ensure that my financial planning strategy ensures their future job security.

RT: I think I would have benefitted from seminars or workshops on some of the nonscience aspects of running a laboratory. There are aspects of personnel, time, and budget management that I had to learn on the fly, and there were definitely bumps along the way that could have been avoided. I did speak with my mentors about some of these topics, but there are always surprises and things that you didn't know to ask about. At my current institution there are quite a few seminars, discussion panels, etc., that cover these topics and are geared toward graduate students and postdoctoral fellows. I think these sessions are particularly helpful for offering practical advice from new and established faculty, and I would have loved to have access to things like this earlier in my career.

RA: Like many new PIs, when I started my laboratory I had little experience in effectively managing a team. To overcome this shortcoming, I found it helpful to do some reading on leadership and coaching. A lot of thought has gone into these topics, usually in the context of business and sports, but it can also be applied to running a laboratory.

What advice would you give your earlier self in regard to hiring and mentoring people?

LC: I would tell my earlier self to hire core technical staff as soon as possible to help get the laboratory running quickly. Having a technician earlier would have helped me delegate work I was initially doing. The outcome would have been more time for me to plan and write grants.

RA: For hiring, I've learned to place a high value on qualities such as personal motivation and mindset. Science is hard! Failure and criticism are a normal part of doing science. I think an individual with a mindset that is resilient and growth-oriented is most likely to succeed. Unfortunately, it is often hard to discern these qualities from a resume or short interview. It usually takes a discussion with a reference or a rotation in the laboratory to discern traits such as motivation and mindset.

RT: I have been really fortunate in the people I have hired. They've been smart, talented, and hard-working. Still, I would

tell myself to be prepared to be direct and to sometimes have difficult conversations with laboratory personnel. I would also advise myself to deal with issues as soon as they arise, rather than wait and hope problems resolve themselves – they never do. I know that I personally would rather get real, honest feedback about my performance, in any respect, so that I can work to improve my weaknesses. So that is the tack I take when I initiate these conversations: I'm trying to help. Besides, an important part of succeeding in this field is being able to take constructive criticism and implement suggestions, whether from grant and manuscript reviews or feedback on presentations. Nonetheless, I dread discussions that I think will upset someone.

TKF: Simply, acknowledging that many students decide to go to graduate school intending to pursue nonacademic careers or are unsure of their future career plans is not enough. To effectively promote their development and future success, this fact must not only be acknowledged but also actively incorporated into interactions with graduate students.

RA: For mentoring, there isn't one approach that will work with every student and I've had to learn to adjust my mentoring approaches to best support each trainee. Figuring out a specific mentoring style requires a lot of listening, adjustments, and takes some time, but it is worth the effort.

What brings you the greatest joy as a PI? Or, what's the best part of being a PI?

LC: I love the intellectual autonomy afforded to me as a PI in academia. I find joy in developing an idea and then testing it.

RA: Of course, the excitement of a new discovery never loses its appeal!

TKF: Outside of the excitement of discovery, witnessing the development and maturation of junior scientists, both in the classroom and the laboratory.

LC: I also enjoy training new scientists and watching them develop enthusiasm for a question and ownership of their ideas.

RA: Observing the transformation of students into productive, creative, and independent scientists is enormously gratifying and is one of the real joys of being a university professor.

RT: I love seeing my trainees succeed! I enjoy seeing their excitement when an experiment works (even better if it supports their hypothesis). I loved working at the bench, and I certainly miss being the one to make a new observation or collect a key piece of data. But seeing a trainee accomplish this is just as rewarding. Then there are the bigger successes – winning a fellowship, a well-received presentation, a manuscript accepted, or a dissertation completed. Most of all, I love seeing them leave the laboratory to take on new challenges – a new job, a postdoc position, a faculty position – and knowing they're well prepared.

http://dx.doi.org/10.1016/j.tim.2017.04.008