Strategies for Obtaining a Faculty Position in the Biomedical Sciences:

Views from Both Sides of the Job Search Process

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Introduction

When I talk with grad students and postdocs about the faculty job market, I consistently hear the same three questions: Do you need a *Cell*/*Science*/*Nature* paper to get noticed? Do you need a grant? Is it brutally competitive? Surprisingly, the answer to the first two is mostly "No." Publications in top journals and a funding history are undoubtedly attractive to a search committee, but neither is essential for landing an interview at many institutions. When I applied for my own faculty position in 2003-2004, I had neither and still got multiple interviews (and offers). The same was true for one of my postdoctoral fellows in 2014. The same has been true for several people I have coached, since. The answer to the third question, regarding competition, is "definitely, yes." With a glut of postdoctoral fellows chasing a limited number of positions, academia has become the real "alternative career."

If you choose to compete for a faculty position, be ready for stiff competition. Sometimes up to 400 applicants for a single opening, though some highly specialized searches draw only 50-100. Up to half of any applicant pool won't fit what the committee is looking for, so your real odds are better than 1-in-400 sounds. If you make the cut for interviews, you'll be one of just two to six finalists. Landing the position is the ultimate goal, but your immediate job is to make your application stand out sufficiently to earn that interview.

If getting noticed is the key, how do you make your application stand out? Many postdocs I speak with are surprised, even mystified, by the whole process. This book offers a personal perspective on what to expect, mistakes to avoid, and a framework for understanding what a search committee is seeking. This information can help you make a realistic assessment of your own prospects. The Appendix includes examples of application materials that led to interviews and job offers. I'll share updated strategies, some of the stranger things I've seen and heard, and stories from other young assistant professors who recently went through the process. Just as importantly, having now sat on the other side of the table as a search committee member, I'll share what I've learned from that vantage point, as well. Appendix L lists additional resources for the job search.

This book can't guarantee you will get a job. What the book can do is share what I learned from my own job search, serving on a faculty search committee, and coaching now hundreds of people on the faculty job market. The book can give you a sense of how a committee is likely to view your application and you. The strategies here are meant to help the committee make the most informed decision possible about your candidacy. The clearer your application, job talk, and chalk talk are, the less the committee has to guess at understanding your goals and research program.

A few of the suggestions and strategies will be mind-numbing minutiae for some of you and pure gold for others. I have encountered these situations personally either during my own job search, when interviewing faculty candidates or were reported back to me by people I coached. My hope is that you will find at least a few nuggets of information in this book that help you get the job you want.

Introduction to V4.0 (October 2026)

It's difficult to believe I first wrote this eBook back in 2009. I've distributed easily thousands of copies of different versions of this eBook. 17 years later, I've learned so much. The mechanics of applying for jobs has changed. We no longer send printed

materials. There are now application portals on the web. The weak spellchecker function of word processors has been turbocharged with the advent of large language model AI. The competition for jobs has become ever greater. It's a little easier to find resources on how to apply for faculty positions.

Over the years, I've updated this eBook to reflect changes in the process such as virtual pre-interviews. This time, I decided it was important to critically reread the eBook and update it. I removed a lot of text and then added several pages of new text that is hopefully more helpful and more current. I've also tried to incorporate stories I've heard from people I've coached more recently. I think this is a much improved resource. That said, I very much want to hear from you. If you thought something was missing. If you thought something was wrong. Even if you thought this was really helpful. I appreciate getting feedback so that I can constantly improve this eBook. I'm still paying it forward after my mentors made the effort to help me achieve my dreams and to explain how the world works. I hope you will do the same for those that come after you.

Chapter 1. Are You Faculty Material?

A tenure-track faculty position demands a diverse skill set, which is part of why the job search has so many steps. You'll be judged as a future colleague, an innovator, a teacher, and for your ability to bring in grant funding for yourself and the institution. That last point matters more than most candidates expect, since universities and departments run on cash, not goodwill. Thinking of yourself and your skills in business terms will help the whole process make more sense. Your research proposal and chalk talk demonstrate your ability to write grants. Your job talk shows off both your science and your teaching. One-on-one meetings with faculty let the department see how you'll fit in as a colleague and collaborator. In the end, you are selling yourself and your research. If you can't do that, think seriously about a teaching-focused position or a nonacademic career instead. Still, despite the business framing, good science remains the number one reason you'll get a job offer; everything else tends to follow from that.

A Brief Digression

Before starting the intense process of applying for a faculty position, it's worth asking why you want to be an academic researcher in the first place. To be clear, I'm talking specifically about tenure-track faculty positions, assistant, associate, and full professor, which come with a lab, startup funds, and the ability to hire postdocs and technicians and train graduate students.

For years, the default assumption in Ph.D. training was that trainees would become academics. That assumption is no longer true. According to a National Science Foundation survey, only 7-10% of postdocs go on to faculty positions (https://www.nsf.gov/statistics/srvygradpostdoc/). Thus, academia is the real "alternative career." Many institutions now have postdoc offices or associations that expose early career scientists to non-group-leader career paths. The actual practical training for nonacademic careers remains relatively thin. The skills needed in industry, patent law, journal editing, or science consulting differ substantially from what most postdocs learn in training.

I want to digress further and comment on training for nonacademic careers. This is the subject of whole chapters and books. However, once you opt out of academia, PhD associated jobs work like normal jobs. You either need the experience to do the job or you need to find a position that will train you up. This goal is achievable and is a common theme in talks about non-academic career paths. Your PhD training should help you learn how to find information, evaluate it, and put it into action. Don't be afraid to reach out to people in the fields you are interested in and conduct informational interviews. You should ultimately be able to determine what steps you need to take to pursue nonacademic career paths.

There are numerous career options available to someone with a PhD. See AAAS's myIDP (myidp.sciencecareers.org) and the National Postdoctoral Association's career center for in-depth descriptions of paths in the biomedical sciences. Even if you're certain you want to become an academic, you owe it to yourself to explore your other options. If you're one of the 60-90% of postdocs who won't end up in faculty or group leader positions, I encourage you to start networking now and gather as much information as you can about your career options.

My last digression (maybe) is to touch on a career option to stay in academia without running one's own lab- staff scientist positions. Many postdocs recognize they don't want to be dependent on grants, to manage people or to get away from the bench. That's an important perspective to recognize in one's self. Staff scientist positions can potentially achieve these goals. But there's a catch. Staff scientists are an expensive hire for a lab. A staff scientist with 5+ years of postdoctoral training can be an $80-120k salary plus 33% benefits. If an NIH R01 grant is $250-$350k a year and the lab head is also getting paid from the grant, the amount of money left for experiments, grad students, and postdocs is not a lot. My best advice for people seeking staff scientist positions is to network early and often to find labs with both sufficient resources to support a staff scientist and research interests that align with your own. Labs with potentially more generous sources of funding (HHMI investigators, group leaders in the NIH intramural program (labs on the NIH campus), labs at research institutes, etc.) have a greater capacity to support staff scientists. It's worth noting that getting a staff scientist position doesn't necessarily insulate one from the demands of a faculty position. Staff scientists that assist with grant writing, training new lab members, leading project teams, and even managing a group within the lab are not uncommon.

The Plusses and Minuses

What can you expect as an assistant professor? First, the Rewards. An academic position is one of the most intellectually rewarding jobs available. You will have the freedom to pursue research that you design. You can train new scientists and impart ideas and ways of thinking that reflect your scientific values. You will be surrounded by colleagues that share your passion for knowledge and interest in your field of research.

However, there are real pitfalls to the academic career track. Grant funding has historically been tight and a large portion of your time will go toward writing grants. Many academic positions carry heavy teaching loads and you'll be expected to serve on multiple, time-consuming committees. Junior faculty often face an up-or-out system. If you don't make tenure or get promoted to associate professor, which typically requires two or more papers a year plus a funded, renewed NIH R01, you can lose your job and have to find a new position elsewhere. Parents face the added challenge of balancing an academic career with raising a family (see the American Society for Cell Biology's 2012 Women in Cell Biology "WICB/Career Strategy Column," http://www.ascb.org/wicbcareer-strategy-column/, for a more in-depth discussion). Finally, while it's possible to earn a comfortable salary as a professor, you won't get rich. The the cost of living in cities like San Francisco, Boston, or New York can be especially challenging on a faculty salary, particularly for families with children.

It should be clear that being an academic is not for everyone. The job can be highly stressful and even disillusioning. However, for the individual that loves basic scientific research and is driven by intellectual curiosity, there are few more satisfying careers than a faculty position. I absolutely loved my job as an assistant and later associate professor. For me, the plusses vastly outweighed the negatives of the academic career path. That said, I'm not running a lab today. When I wrote the first version of this eBook, I had been a professor for four years. Seventeen years later, my priorities have changed. I write this remind you that if you have a PhD, you don't need to be an academic to be a success. It's OK to leave academia. It's OK in general for your needs

and interests to change. That's not a failing. That's life. Furthermore, I think it's healthy and valuable to make some time every couple of years and ask if you're in the career that is best for you now? If you have an interest in other careers, invest some effort into learning about other careers. I seriously considered going into patent law, counter-bioterrorism, and industry, before becoming an academic.

In my own case, I LOVE science. I have since I was 7 years old and that has not changed even a little bit. What has changed was thinking about what I could do that was most meaningful and impactful for me. I feel like the academic community has done a poor job of preparing people for all careers in science, even the academic track. Too much crucial information requires extra effort to find. Vital things like how to prepare a chalk talk are rarely even taught. I'm confident the world does not need to be this way. My position at Janelia Research Campus gives me the opportunity to help a group of early career scientists navigate these challenges and to even share this information (like this eBook) more widely.

What to Expect.

Being an academic is not a 9-to-5 job. It consumes a great deal of time. My more senior colleagues assure me that promotion brings even more travel, meetings, grant study sections, grant writing, and committee work. Despite the busy schedule, I still managed time with my spouse, my cats, my garden, vacations, and nonscientific reading. An academic research career is truly a lifestyle, and anyone contemplating it, along with their spouse or partner, should go in with eyes open about the time commitment.

My typical workday as a junior faculty consisted of:

1-2 hours of committees
1-2 hours of seminars and meeting with seminar speakers
1 or more hours of answering emails and sending reagents
2 or more hours of designing experiments, interpreting experimental results, and troubleshooting experiments that are not working
2 or more hours thinking about and writing grants and papers
2 or more hours performing experiments
plus time for reading journal articles, reviewing manuscripts, ordering reagents, managing people in the lab, preparing for and teaching lectures, preparing to give talks at meetings and other institutions, interviewing students/postdocs/faculty candidates, and advising colleagues on experimental design and interpretation.

If you look closely at the schedule, you will notice that most of the time is spent doing, interpreting, and discussing science. I thrive on this immersion in science and this is why I became a scientist in the first place.

Where do I sign up?

Getting a faculty position in the biological sciences today is exceptionally competitive. It's no secret that there's a glut of postdoctoral fellows in the United States: conservative NSF estimates put only ~7-10% of life sciences Ph.D.'s in faculty positions five years after finishing their Ph.D. (https://www.nsf.gov/statistics/srvygradpostdoc/), and that's a national average. Rates vary substantially between individual postdoctoral training

institutions. Grant funding through traditional government agencies can also be hard to come by; over the past 20 years I've seen NIH funding paylines range from the top 1% to the top 18% of scored grants, though there are mechanisms that improve funding odds for new investigators. If I was able to get funded, there's hope for anyone with a faculty position. Interestingly, preparing a chalk talk draws on many of the same elements that make a grant fundable. That's not a coincidence. More on that later.

Assuming that the academic lifestyle appeals to you, it is helpful to assess your potential to obtain a faculty position. For most early career scientists, completing a postdoctoral fellowship is a minimum requirement for becoming eligible to apply for a faculty position.[1] Beyond this there are several factors that establish your suitability as a candidate. In general terms this includes several of the following:

1. Strong evidence of productivity in research
2. Strong letters of recommendation
3. A fundable research proposal
4. History of funding.
5. A deep sense of novelty or creativity
6. Expertise in technology or methodology
7. Evidence of teaching ability
8. Confidence

In more specific terms,

1. Strong evidence of productivity. This is the meat and potatoes of your application and what immediately sets you apart from other candidates: how many preprints have you posted, how many papers have you published, in what journals, and are you first (or even corresponding) author? If you're nearing the end of your postdoc with no papers or preprints (and nothing on the very immediate horizon), you can generally forget about applying for a faculty position, though there are exceptions to every rule. A good friend of mine landed a faculty position without a single paper published as a postdoc (see "The Exception to the Rule" box). Her postdoctoral advisor's reputation, the quality of her research project, and her presentation skills gave the search committee confidence that she'd be highly fundable and successful as a professor. Still, her situation is a genuine exception, and you shouldn't count on repeating it.

What if you have only one paper? Unless it's in a high profile journal in your field, you'll have a difficult time getting noticed by the search committee. Two or more first author papers as a postdoc in good quality journals is generally the minimum you'll need. Additional co-authored papers help demonstrate your productivity and ability to work with others (a desirable quality). Reviews, methods chapters, and book chapters look good on a CV, but they won't compensate for a lack of peer reviewed, first author original research. As always, there are exceptions.

[1] *There is a small percent of people that apply for faculty positions and mostly independent fellow/small lab positions straight out of graduate school. I know a few people in this category and they generally were already highly independent, often managed a small group of people in their graduate lab, and were highly productive. If you're ready, you don't have to necessarily do a postdoc.

The Exception to the Rule

One friend, Dr. A, obtained a tenure-track faculty position at a medical school without going through a formal application process and without even having a first author publication from her postdoctoral training. In her case, Dr. A had four first author publications in good journals from her graduate training. She was postdoc'ing in a high profile lab and had a compelling research story. Taken together, Dr. A did have a track record of accomplishment. Importantly, Dr. A had the opportunity to present her story as a talk at a prestigious small meeting. One of the attendees was sufficiently impressed by the story that he recommended to a colleague to interview Dr. A, which led to a job offer. First author papers from Dr. A's postdoctoral training did eventually get published and Professor A went on to get an R01 grant. Therefore, it's helpful to remember that every presentation you give is an audition that can change your career.

At the same time, it is NOT essential that you have a *Nature*/*Cell*/*Science* paper to get a faculty position. I did not, my postdoc did not, my grad student did not. Yet, we all got faculty positions. Having a paper in a high impact journal certainly can help your chances. Not having such a paper will not necessarily remove you from consideration by a search committee.

Manuscripts classified as "in preparation" or "to be submitted" don't count as productivity. Some applications I have seen go so far as to say "to be submitted to Science." Again, this is not going to impress anyone and remains purely hypothetical. Anyone that has ever written a paper knows how time consuming it can be to prepare the manuscript and win over the editor and reviewers. Until your manuscript has been at least posted as a pre-print and, better yet, peer reviewed (and hopefully accepted), it isn't worth much. You can identify manuscripts that are under review and even submitted. Don't bother mentioning the journal until the manuscript has been accepted.

Preprints have changed the productivity equation a bit. A preprint IS a manuscript. There could still be some preparation involved, but most labs do not post half-baked preprints. That would reflect poorly on the lab and could set the lab up to be "scooped." Therefore, a preprint, which is now considered referenceable for an NIH grant or a publication reference list, is a great way to demonstrate that you have been productive. Your lab considers the preprint ready to share with the world and what remains now is satisfying reviewers and editors, which is quite different from claiming a manuscript is in some vague stage of preparation. I do not have any statistics on whether anyone is getting faculty positions based primarily on preprints. My sense is that preprints are not yet equal to peer reviewed published papers, but a first author paper plus a first author preprint could now qualify as "productive."

2. Strong letters of recommendation. Letters of reference are key components of your application. They're supposed to be an honest, confidential assessment of your abilities and your potential to succeed as the head of a laboratory. The important thing is to get letters from people who know you best and can ***sell*** you convincingly to the search committee. Typically, these people will include your graduate advisor and your postdoctoral advisor, plus collaborators, thesis committee members, or other mentors. It

helps if one or more letters come from a recognized name in your field. Not every committee member will know the leaders' names, but for better or worse, name familiarity is a frequent enticement to look more closely at an application. A list of famous referees isn't essential, but it doesn't hurt.

Sometimes, I've been asked about what happens when you've had a bad relationship with your thesis advisor or a postdoctoral advisor. The good news is that I've seen people still get interviews and faculty positions even if they could not ask a former mentor for a letter. There are a few potential solutions. First, if it's your thesis advisor, in the US, you typically have a thesis committee and the other members are often supportive of you. Assuming your thesis advisor is the person that is being unfair or difficult, you could ask a thesis committee member to write a letter helping to explain the situation and verify that you did great work for your thesis. If it's your current postdoctoral advisor, then hopefully you have identified one or more individuals that could serve as a second mentor/reference. That second mentor could also help sell your abilities and explain the issue with the postdoc mentor. A stronger (and longer) option is to leave the first postdoc position and achieve some success in the second postdoc lab.

3. A fundable research proposal: The fundability of your program is very important. The ability to conduct research depends on obtaining funds. Equally importantly, your future department and university depend on the overhead costs generated by the grants you will obtain. Therefore, your research proposal should be novel, innovative, significant, and achievable by you. In short, your future lab's research problems should appeal to grant study sections. As you are probably not a seasoned grant writer at this stage of your career, it is essential to get input from funded investigators and better yet from people that serve on study sections regarding the fundability of your proposal.

Your proposal should also reflect the requested focus of the job advertisement. If the search committee is looking for an NMR specialist, you are usually wasting your time sending in an application touting your expertise as a *Drosophila* geneticist. See **Step 3: Do your Homework** on page 31 for a more detailed discussion of matching with a department's job search criteria.

4. History of funding: Previous funding is helpful, but rarely required. If you have a history of funding, then hurray! You have some experience generating fundable proposals. You may also have a transition award that can be carried over into a new faculty position. Transition awards are strong evidence that a funding agency considers your future research promising, innovative, and fundable. Transitions funds can be very helpful for setting up your lab. Yet, it is rarely held against a candidate if they don't already have a grant. Transition awards (e.g. K99 from the NIH) are highly competitive. I have seen a few places that require a transition award for consideration for a faculty position. Curiously, these ads are often not posted by the top institutions. My take is that these programs will probably not provide as much in the way of startup funds and somehow think that applicants will view this as a positive thing. Weird.

5. A deep sense of creativity: Creativity is an important, but not always tangible quality sought in faculty position candidates. Creativity is best demonstrated by your publications and the letters of reference. Referees will note your ability to ask novel

questions, create solutions for difficult problems or interpret data from a different perspective. Your research proposal also reflects creativity, which distinguishes you from someone that is "merely" hardworking. While much scientific progress depends on the countless hours of effort by researchers to move a project forward, projects are entirely dependent on the ability of a researcher to design the project, interpret data, and propose experiments. If you specialize in putting in long hours and depend on your PI to interpret experiments, write manuscripts, outline your talks, etc., then you are not yet ready for a faculty position. You will have to be able to do all of these things in your own lab.

6. Technical expertise. Expertise can sometimes get you an interview even if other parts of your application aren't as strong. Some job ads seek a specific skill set, such as a model organism, proteomics, cell cycle, imaging, and so on. If you trained in a top lab in that area, you may be exactly what a search committee is looking for. In some cases, the committee may care more that you can provide a service several people need than about your productivity as a postdoc. Just be aware that in these situations, you may be viewed more as a core facility operator who's also expected to teach and win grants. I am speaking from personal experience here. The added responsibility of running a core facility means less time for your own projects.

7. Evidence of teaching ability: The importance of teaching skill varies with the relative emphasis on teaching at the institution. For jobs in graduate departments at medical schools, with only a few lectures a year of teaching, there may be no criteria for teaching ability. In contrast, undergraduate institutions often will want some assurance that you *can* teach. If there is a strong teaching component in the job advertisement, you probably need to have prepared lectures and taught a class. You may have obtained this experience as a Teaching Assistant in grad school or taught courses as a postdoc at community colleges or night schools. Note that teaching in a summer course, e.g., a Woods Hole or Cold Spring Harbor course, can satisfy the teaching experience criteria for some positions. For many institutions, it helps if you have given at least one lecture to undergraduates or graduate students or taught a hands-on laboratory. Aside from adding to your CV, teaching can improve your ability to communicate with and train young scientists. Also, getting some experience will help you determine whether you enjoy teaching, which will in turn impact what types of faculty positions you want to apply for. Finally, many schools will have a part of the interview when you will be asked about your interest and thoughts on teaching. You will want to have answers for those questions.

8. Confidence. As a postdoc, you depend on your ability to do research and for your PI to continue funding you. The risks of losing the ability to conduct research are relatively low in the short term for the postdoc. As a PI, **everything** depends on you. Success in research depends on your perseverance, creativity, your ability to persuade others of the importance of your research problem, and some degree of luck. To become an academic, you need to have the confidence that you can take the leap of faith that your career will succeed. For those of you with imposter syndrome, and most of us have at least some imposter syndrome, you can learn all of these things. It's OK if you have some doubts. That's healthy. Your Ph.D. training helps prepare you to learn how to learn. To adapt.

Self Evaluation through the Eyes of Others

Viewing Yourself from the Perspective of the Search Committee.

Each of the qualities listed above form part of the evaluation of your merits by a search committee. Exceptions exist for each item I have identified. For example, if you have a transition award, the search committee may rank you as comparable to an individual with letters of reference from famous scientists. Three first author Cell papers will often get you an interview at many institutions even if your other qualities are merely average (but if you're merely average and have 3 first author Cell papers, something is amiss).

Search committees are seeking faculty candidates that will be future peers and will be able to benefit the department intellectually and financially. You are a commodity and are being evaluated as such. Therefore, even if you and applicant B are both experts in microscopy, you may have a longer history as an instructor and a better research proposal. Anyone considering applying for a faculty position needs to realize that search committees (at most institutions) are hiring peers, not a member of the National Academies of Science or a front-runner for the Nobel Prize. If one looks at websites for junior faculty at many institutions, the common traits that emerge are that the junior faculty often have productive publication records consisting of two or more first author publications in respectable journals, such as Journal of Biological Chemistry, Journal of Cell Biology or Molecular Biology of the Cell (or name of quality journal in your field). Often, junior faculty trained in the labs of scientists with significant name recognition. Most importantly, junior faculty often have proposed exciting potentially fundable research projects. All three of these factors are frequently interlinked- that is, a postdoc in a good lab will tend to publish exciting papers in good journals and will develop novel projects with strong funding potential. These qualities summarize what most search committees seek in applicants for junior faculty positions. Having a *Nature*/*Cell*/*Science* paper or a grant is a plus when being reviewed by a search committee, but is not required.

Viewing Yourself from the Perspective of a Grant Funding Agency

You represent a commodity that can bring expertise and funding to the department. To assess your potential, you need to view yourself as a grant study section would. Here, it is useful to review the criteria for scoring NIH grants. In addition to the evaluation of the quality of the proposed research, the there is a section on whether the PI is likely to be able to perform the proposed research. This ability is not established by letters of reference. Rather it is a combination of the number and quality of your publications, your preliminary data, where you did your postdoctoral training, your expertise related to the proposed research, and the quality of the institute where you will be performing the research (more on this in Chapter 3). Note that at the time of this latest version of the e-book, NIH and other institutions are trying to minimize the biases that emphasize individual, lab, and institutional reputations. How this will play out in hiring and funding remains to be seen.

Chapter 2. Putting Together an Application

The application process requires a significant investment of time and effort to assemble materials. You will want to begin this process long before you apply for jobs. A typical application will consist of the following items:

- *Cover Letter*
- *CV*
- *Research Proposal*
- *Three letters of Reference*

Many applications will also include:

- *Commitment to Diversity Statement*
- *Teaching Statement*
- *Copies of your top three publications*

Each of these items deserves your full attention. It helps to think of every application component as serving two roles at once. First, there's the basic evaluation: is the requested item present, and how good is it? Second, and just as important, reviewers are looking for a reason to put an application in the "do not consider further" pile. Applications are meant to give a holistic picture of a candidate, but in practice they're also picked apart. When a committee has to screen hundreds of applications down to a shortlist, it's faster to search for flaws first. Every mistake makes it harder for a reviewer to stay interested. Grammar errors, formatting problems, a rushed essay can sink an otherwise strong candidate. That's the reality of the competition. Given that it's taken you 5-12 years (on top of undergrad) to get to this stage, why undermine your chances over something that might cost you a few extra hours, or even an extra week? You owe it to yourself to assemble a high-quality application.

I suggest tackling them in the following order:

1. Prepare your CV. By now you know whether you have the typical minimum requirements to apply for a faculty position (see Chapter 1). Your CV is one of two foundational items in your application, along with your Research Proposal, and it's something you'll need to hand to anyone you ask to write a letter of reference.

There are many styles for preparing CVs and this is not meant as the only possible template. A good CV will be concise (brief is good), easy to read (no fancy fonts), and informative. I have included an example of the CV I submitted when I applied for a faculty position. **See Appendix B for examples**.

Important Tips

Use a legible font- Arial, Helvetica, Times size 11 or 12. Don't get fancy and don't try to pack too much information into a line.

Limit (or just avoid) the number of manuscripts in preparation to manuscripts truly in preparation. Many people, myself included, will list things that have not yet been submitted to a journal for review. If the majority of the work is done and you can talk about the story during your interviews or even better have the preprint posted and/or manuscript submitted by the time of your interviews, then you can update the search committee on your progress. See pages 8-9 for more thoughts on manuscripts in preparation.

Limit your application CV to two to three pages. The search committee will have to read hundreds of applications and will appreciate your brevity. It's important to keep a long running complete CV, but you don't need to share the full version of the document in all situations.

Provide information relevant to a faculty position. This can include any journal review duties in which you (not your mentor) are solicited by editors to review manuscripts, committees you served on as a postdoc or grad student, courses you taught, research-related awards you have won, etc. Do not include items such as hobbies (you probably have hobbies, but the search committee wants to know that your main goals are to establish your lab, get grants, write papers, and teach) or information related to college or high school unless it is related to relevant research experience. One time, a colleague got a CV from a candidate that listed testing life vests for the Coast Guard as "research experience" for a protein chemistry job. The applicant didn't get an interview.

Do include your name in a header or footer in your CV and all other application materials. Also, number pages of each file, separately. Make it easy for the search committee to keep your materials in order.

For your bibliography, include an ORCID (the leading persistent digital identifier). ORCID uniquely identifies you among all the other John Smiths, Sue Joneses, and Justin Wangs of the world; set up an account at http://orcid.org.

2. Prepare your Research Proposal. This is so fundamental to your application that I've now dedicated a whole chapter to this topic. See Chapter 3. I also HIGHLY recommend that you hone your chalk talk with people that have served on search committees **before** writing the research proposal. Chalk talks take time to prepare and revise. Strong research proposals align with the chalk talk that you will present in an interview.

3. Letters of reference. With your proposal and CV in hand, it's time to contact your referees, and to give them these materials so they can write as detailed a letter as possible. A letter that just says "I know Bob. He works hard and did a good job in my lab" won't help you. A strong letter explains, with concrete examples, how you solved problems, where you showed innovation, and why you have great potential. Since you're not supposed to see your own letters, it's essential to choose people who will write strong, detailed ones. Start with your graduate advisor and postdoctoral advisor, who know you best; it's reasonable to ask them directly whether they can write you a strong letter. A weak letter is survivable — a negative one is the kiss of death. If you don't have a good

relationship with an advisor, or something more serious has happened (fraud, harassment, or similar), consider asking someone else instead, and be ready to explain that choice discreetly and professionally if asked about it in an interview. Also, if something problematic happened like your advisor has died or become notorious, you can ask a thesis committee member, a collaborator, or department chair to write an explanatory letter and/or supporting letter.

In general, your referees should be current or former professors or group leaders. The reason is that many letters are submitted along with a short questionnaire that asks the referee to rank you relative to others at your career stage. For example, Is the candidate in the top 50%, 20%, 10%, 5% or 1% of postdocs you have known. Someone that has not run a lab will not have the credibility with the search committee to make this assessment.

Most applications require at least three letters of reference. The third letter should come from a mentor, thesis committee member or collaborator that knows you and your research well. Again, confirm that they will be able to write a strong letter of reference. If you have additional collaborators that know you and your work well, then you should consider also requesting letters from them. There are rarely limits on the number of letters of reference you can submit. Still, do not plan to submit more than five letters as it will overwhelm the search committee members.

Once you have identified and contacted your referees, given your referees enough warning so that they can prepare a letter before you start sending out applications. Waiting for letters of reference is usually the last step of the application process. Many job sites email your referees a portal for submitting letters. The portal may or may not tell you if all of your materials have been received, so do stay on top of ensuring your applications and all associated materials are complete. Your referees are busy people, but it is OK to nudge them if you're getting close to the application deadline and letters still have not been sent.

In some cases, your referee will ask you to write your own letter of reference that the referee will plan to sign. While it may sound odd, it is not uncommon to have to write a letter of reference for yourself. *You are not signing someone else's name to the letter. That is forgery and illegal.* Rather, some people assume that you know yourself best and can point out your strengths and accomplishments. In addition, the letter you write may be used as a starting point and will be modified by the referee. Writing your own letter of reference is something I still find a bit surreal.

The key to an outstanding letter is that your <u>abilities</u> are highlighted. Simply stating that you had a project and got papers is meaningless to a search committee. Furthermore, just listing your technical skills is not necessarily appropriate for a faculty candidate. Technical skills are typically listed for technician and, sometimes, postdoc positions. In contrast, describing how you had to overcome particular hurdles, developed the question and strategy to solve the problem, worked out new techniques or established a new direction for the lab is far more informative and interesting. Your project and its overall success should be apparent from your publications. A good letter will add new insights into what you did as a postdoc or grad student and what kind of scientist you are. A final suggestion for writing your own letter is to describe how well you work with others and what kind of lab citizen you are. Have you trained people? Do you oversee people working on your projects? Do you contribute to the well-being of the laboratory?

These are things that reassure a search committee that you are a potentially compatible future colleague.

4. Cover letter. This is the first thing your search committee will see. It should tell them who you are (e.g., a postdoc at School X), which job you're applying for (assistant professor, job number if the ad provides one), and where you saw the ad (the Dec. 10 issue of *Science*). The next paragraph describes your expertise, what you've worked on and what you propose to work on. Critically, this paragraph should be framed around the ad, which should be much easier to write now that you've drafted your research proposal. State who will be sending your letters of reference, then close with your email, phone number, and that you look forward to hearing from the committee. I used to recommend using institutional letterhead to look more professional. I've since learned that letterhead indicates the letter is related to the institution. You are applying to advance your career. This activity has nothing to do with your postdoctoral institution. Do use your lab address rather than your home address to signal that you're currently productively employed. See examples in Appendix D.

5. Teaching Statement (or Teaching Philosophy): This is not required for all jobs. You will want to have at least one version prepared. Expectations for a teaching statement will depend on the institution and type of faculty position. In general, your philosophy should be brief (one page). It should reflect your teaching experience, groups that you intend to teach (undergrads, grad students, and even postdocs), what courses you would be capable of teaching (emphasis on capable, i.e. don't say Anatomy if you've never taken an Anatomy course), what style of teaching you would promote (interactive, active learning, peer-to-peer, synthesis, etc.), particular items that you would emphasize (i.e. include history of cell biology in your cell biology lectures or the experimental basis behind current theories), and more details regarding how you prefer to evaluate students (testing style, i.e. essays vs. rote memorization, etc.). Furthermore, you'll want to note aspects of mentoring and training as they are also forms of teaching. How do you train a new undergrad in the lab? Can you point to examples? If you mentored someone in the past, are there outcomes you can cite, such as a poster at a conference or middle authorship on a manuscript? If there are no obvious outcomes, that's not the end of the world. Some mentoring is usually better than no mentoring. Finally, it's helpful to describe how you might incorporate your Research Proposal into your mentoring. For example, if you are applying to an undergraduate institution, what kinds of projects might you be able to develop with undergrads? Do you use a technology that you might be able to teach to other trainees at the institution?

A common misconception is that you should plan to create multiple new courses. On the surface, this sounds like you're making yourself more attractive. Yet, this strategy can backfire in two ways. First, you're potentially promising to make new courses. Even one new course can be a tremendous amount of work. Do not underestimate the rough estimate that one hour of lecture requires ten (10!) hours of preparation. Second, you may be signaling a lack of appreciation of how much work teaching can be. You need to focus on getting your lab up and running, not developing multiple new courses, unless you are applying to a teaching intensive institution. In that case, you will not be submitting a

philosophy so much as a portfolio of your substantial background in teaching. **See examples in Appendix E.**

You may be wondering about whether you should comment on using (or not using) AI in the classroom. It's a great question and the matter is not settled. The answer can vary between institutions, courses, and types of implementation. In 2026, as higher education navigates use of AI, it's worth seeing if the institution has any accessible policies so that you might be prepared to discuss AI use in an interview. Also, if you have experience using AI in pedagogy, be prepared to discuss it in terms of benefits and concerns. Personally, I'm not convinced AI is inherently bad for teaching. I think the challenge is to find ways for students to engage interactively, rather than having AI perform the task without oversight.

6. Commitment to Diversity Statement: This essay was common in the early 2020s. Since then, there has been an almost overnight disappearance of the essay. Even online resources that institutions provided in the form of example essays have been scrubbed from the internet.

7. Copies of your top publications. Send high-quality PDFs (or links) of your most representative publications (papers or preprints). It isn't always obvious which three qualify as your "top" publications. In general, prioritize first- and/or corresponding-author work. If you have more than three strong candidates, choose the highest-profile original research articles. A co-authored paper in a top journal can sometimes outweigh a first-author paper in a lower-impact one, but only if you made a substantial intellectual contribution to the study. Reviews and book chapters are less compelling, since they may not be peer reviewed and tell the committee little about your own research. Meeting abstracts are usually not acceptable either, except in fields like computer science and machine learning where conference proceedings are the standard publication venue.

In the era of open access and open science, the definition of scientific contributions is expanding. A patent can be extremely valuable. A data set, a website, software or an app can be an important contribution to the field. A popular plasmid made available on Addgene. Middle authorship that provides key support for a study, such as modeling or data analysis. In these less traditional (but still important cases), you should highlight your contribution in your CV, and if relevant, in your cover letter or Research Proposal.

Your Online CV (intentional and not)

Now is also a good time to update your LinkedIn profile with a current, high-quality (preferably professional) photo, relevant information from your CV, and anything else that wouldn't fit in a standard CV. It's also useful and sometimes sobering to Google yourself and see what your online presence looks like, since committee members are likely to do the same. You need to know if those wild party photos or old online political rants are going to turn up. Obviously, review your social media accounts too; if needed, you can clean some of this up yourself or hire a service to help manage your online presence.

The Importance of a Well Organized, Well Written, and Appropriate Application

A couple of things have stood out to me when reviewing applications as a member of a Search Committee. First, several applications were genuinely outstanding, but a complete mismatch for our department, a cell biology department. For example, applications clearly focused on genetics, systems neuroscience, or development were never going to be considered, no matter how strong. It's like sending a letter to Santa addressed to the Easter Bunny. Second, some applications were sloppy or barely more than a bare CV. The ones that survived the first round of screening (not necessarily all the way to an interview) were relevant to the advertised position and the department's interests, had quality publications, often came from well-known labs, were well written and organized, and sometimes came with a significant grant or fellowship already in hand, such as an NIH K99 or Burroughs Wellcome career transition award.

The decision to invite candidates for interviews involved careful reading of letters of reference for strong endorsements and warning flags, discussion of the fit of a candidate's research program with the goals of the department, determination of the potential cost of bringing candidates with expensive equipment needs, any personal knowledge that faculty had of the candidates (and the postdoctoral advisor's lab), and unscientific gut feelings by search committee members. *One of the decidedly scary realizations I have had is that success for getting admitted to graduate school, obtaining grants, and getting a faculty position all depend to a degree on intangibles.* Were all of the committee members sufficiently caffeinated and not suffering from low blood glucose levels? Was the application discussed at the beginning or the end of the review process? Did someone on the review committee misunderstand something about the application and have a strong, but not necessarily rational aversion to the applicant's research or PI? All of these things do happen.

While it isn't productive to dwell on these intangibles, it is useful to appreciate that the process is inherently imperfect and there will be circumstances beyond the applicant's control. However, you should make your application:

- Easy to read
- Organized
- Responsive to the job posting

You can put your reviewers in the best possible frame of mind and encourage the reviewer to give your application full consideration.

General Suggestions

USE SPELLCHECK!!! This is the simplest thing you can do to jazz up your application. Misspellings indicate that you do not pay much attention to detail. You have time to prepare your application materials. They should be perfect.

If English is not your native language, have someone with excellent grammar read and correct your application materials. Unfortunately, spellcheck and even grammar check in writing programs will not always pick up some of the writing problems of nonnative English speakers. Reading several sentences that lack articles or have the wrong pronoun or verb tense will give your committee the impression that you may not be able to write very well. The committee may (unfairly) conclude that your poor grammar reflects poor

scientific skills, an inability to teach, and probably difficulty writing grants. Your application MUST look perfect.

Fortunately, in 2026, ChatGPT and Claude appear to offer an impressive ability to improve the quality of the English in the document for both native and non-native speakers. I cannot report on Grok or Copilot. They may be good, but you will want to assess them with some tests before relying on them. I have some suggestions on using AI.

Using AI tools to Prepare Application Materials

1. **ChatGPT, Claude, and Gemini are now widely used for polishing grammar and phrasing on cover letters, CVs, and research proposals.** This is helpful for anyone.
2. **The risk of over-relying on AI to generate substantive content rather than polish their own words.** Search Committees can often tell when a research proposal sounds generic or doesn't sound like a working scientist wrote it. Reviewers increasingly notice telltale AI phrasing or cadence. I prefer AI for editing content or making suggestions, not for doing the writing for me.
3. **Never let AI invent or embellish factual content** (publications, techniques, numbers). "Hallucinated" details in a research proposal can seriously damage your professional reputation, beyond the immediate job search.
4. **Check institutional and journal/funder policies on AI assisted writing disclosure.**
5. **AI can be a useful practice partner for chalk talk and job talk Q&A prep (e.g., prompt the AI to play a skeptical search committee member).** However, AI is not a substitute for practicing with real flesh and blood colleagues that know your field. Even better if they have served on search committees.

A Note on Language

I owe a debt to Karen Kelsky for pointing out a specific language problem in her book, The Professor is In (Kelsky, Karen. The Professor is In: The Essential Guide to Turning Your Ph.D. Into a Job. New York: Three Rivers Press, 2015.). The problem I'm referring to is the use of overly deferential language. Examples:

I would be honored to serve in your Department.
I would be thrilled to be granted this opportunity.
I am in awe of the reputation of your Department.
I hope to be fortunate enough to get the opportunity to interview for this position.

These aren't the only examples, but they're common ones. The problem is that you're interviewing to be a colleague while presenting yourself as a postdoc, a trainee, a lesser person. Treat your readers, and later your interviewers, as equals. It's easy to feel like an impostor when you don't yet have a faculty position. Yet, by applying for a faculty position, you're declaring that you're capable of operating at the level of a junior faculty member. You've trained for this role. If you don't believe you're ready, don't bother applying. This isn't about being arrogant or pretentious, which are just as insufferable. You must present yourself as a colleague, not as someone deferential and unworthy.

Planning Ahead

At this point your first possible interview is still weeks to months away. However, you should begin preparing your job talk and your chalk talk so that these will be well polished by the time you get an interview. In fact, **I strongly recommend preparing your chalk talk before writing any of your application documents**, but people rarely listen to me on this point. See Chapter 6 for a discussion of job and chalk talks.

There are a couple of additional items worth assembling now. First, you need at least a rough sense of what it will cost to start up your new lab and run it for a year, since you'll need to discuss start-up needs during interviews and negotiations. Talk to people who've recently started labs and get their purchase lists; update the prices from current catalogs, and don't worry about finding the best deals. If anything, overestimating is useful at this stage, since you just want a realistic price range. For any expensive piece of equipment (generally over $20,000, often over $50,000), plan to negotiate it as part of your start-up package, and arm yourself with as much information as possible: get a quote for the exact instrument, make extra copies for the department chair, and if it's especially expensive (over $100,000) be ready to justify why it's the best option compared to competitors' products, ideally because you've used it before, not just read about it. Learning how to justify equipment is good practice anyway, since you'll do the same thing writing the equipment section of a grant. Start-up costs go beyond reagents and equipment: budget for meeting travel, publication costs, at least a year of tech or postdoc salary, and core facility charges. See Appendix G for an example (Please note this example dates to 2004 and costs have risen **substantially** since). Start-up negotiations are covered in more detail later, in Chapter 8.

You will want to do some general homework and learn how much new faculty are making at different kinds of universities. Much of this information (up through 2024) can be found for 2 and 4 year colleges at **http://data.chronicle.com**

There are other free resources, esp. for state universities. AAMC publishes surveys of faculty salaries, though this is behind a paywall. My general view is that it's good to have a sense of what the range of going rates is. However, those numbers will vary by location, experience (e.g., an MD vs. a PhD), and how much room the institution has for negotiation (often greater at private institutions).

This information will help during your interviews and at negotiation time. If asked your required salary, don't "low ball" yourself with an underestimate and don't ask for an outrageous salary, i.e. $300,000 as an assistant professor at a small liberal arts college in a small town.

Financial Preparation

You should be prepared financially for the job search. It will not be free. However, it should not cost you more than ~$500-1000. You will get reimbursed for most of it, but there is likely going to be a delay between when you attend interviews and when you get reimbursed for your travel costs. If, for some reason, you don't have a credit card, get one before you anticipate scheduling interviews. If your credit limit is only $1000, you will probably want to raise it to $5000 or more to cover plane tickets that will eventually be reimbursed.

Finally, make sure you have suitable interview clothes and luggage. Very few institutions will expect a three-piece suit. You can wear one if you want, but I don't recommend it. Business casual generally sets the right tone. This might include:

For men: An oxford shirt and slacks (khakis are fine, jeans are unacceptable), a necktie (bow is OK, but no wild or loud patterns), socks (I'm talking to you, California)- specifically dress socks, not athletic socks, and comfortable professional shoes that are in very good condition (no tennis shoes or sandals). Sweaters are fine. Sports coats are fine. No exposed t-shirts (I once saw a candidate unbutton his oxford shirt and expose the chest of his t-shirt for his job talk. Definitely too casual.). Clothes should fit well and be ironed. Check them out long before your interview. Based on personal experience, it's embarrassing to discover a pair of pants or collar is tighter than you remember.

For women: I'll defer to someone with more expertise in this area than I have. Karen Kelsky has extensive advice on dressing for faculty interviews. See Kelsky, Karen. "How to Pack and Dress for Your Campus Visit (Inc. Cold-Weather Tips.)" The Professor is in. 11/15/2011. **http://theprofessorisin.com/2011/11/15/1947/**

For Gender Non-binary Resources, please see suggested guidance at this link: https://uwosh.edu/career/wp-content/uploads/sites/38/2016/05/LGBTQandGenderNon-binaryResources.pdf

In addition:
-A small umbrella. It rained or snowed at several of my interviews, which are often in winter months.
-A clean jacket or coat in good shape. Think business casual. No jean jackets or sweatshirts.
-A briefcase, notecase or backpack in good shape. A ratty backpack is too casual. You're not famous enough to be eccentric, yet.
-Make sure your laptop computer has a mobile hard drive and access to a cloud storage account. Remember your power cord.

Chapter 3. The Research Proposal

Previous editions of the eBook elaborated on the Research Proposal in the Putting Together an Application Chapter. However, it's a challenging document and deserves its own chapter.

Research Proposal Structure

The Research Proposal (also called a Research Statement or Research Plan) is a foundational piece of your application. You'll need to prepare it early so you can share it, along with your CV, with your referees. The Research Proposal links to your job talk, your chalk talk, your cover letter, and even your teaching statement. At Janelia, we strongly encourage postdocs to hone their Chalk Talk (see Chapter 6) **BEFORE** writing the Research Proposal. We've found that as applicants develop their chalk talk, the goals shift and the sales pitch gets sharper. It's OK if your Research Proposal and chalk talk end up somewhat different. However, with enough preparation that's usually unnecessary. What matters more is that a strong sales pitch in your written materials is what attracts the search committee's attention and gets you the interview in the first place. Remember, you only give a chalk talk once you've already been invited to the institution.

The Research Proposal (3-5 pages) is a brief statement of what you did in your postdoctoral training (~ half a page) and mostly about what you will do when you start your own lab. While there is not a required format, the research proposal is often divided into three sections. The first section is 1-2 overview paragraphs. The goal is to help a reviewer learn what's exciting about your research program. The second part will be a concise narrative of your research experience and accomplishments to date (primarily postdoctoral studies). Even though this may span up to ten years of your life (!)(grad school and postdoc training), you need to distill this material into less than one page for most applications. Fortunately, much of this is published, so it's less a matter or describing something in detail and more about a high-level overview. See **Appendix C** for examples. The third part (Future Plans/research proposal) should be a mix of paragraphs and figures (preliminary data, models, etc.), as in a grant progress report/proposal. As noted above, you can include specific aims (or goals).

Your future research plans should (not surprisingly) share some characteristics of a strong NIH R01 Specific Aims page. Identify the **knowledge gap** your research will address. Explain how your research will advance the field if successful. Show how your program is innovative, such as unique reagents, cutting-edge techniques, and exciting new questions. It's OK to mention the specific aims for your first grant proposal, but these are not usually required for most Research Proposals. However, the word "aim" is used loosely. A single Research Proposal "aim" is roughly equivalent to a whole grant, which itself often contains three narrower aims. At Janelia, we encourage applicants to use the term "goal" instead of aim to distinguish grants and grant aims.

Some research proposals try to cover several different areas of interest. You need to resist that urge and limit your focus to one overarching question. You don't get extra credit for having lots of ideas on a Research Proposal. Imagination is great, but you need one main question to drive your new lab. As with grant review, too many topics signals

that you're unfocused and can't prioritize. Unfocused effort gets diluted and often falls short of its goals.

Before getting too far, you need to establish what, if anything, you will be taking with you from your postdoc lab. This means that you will have had at least one conversation with your postdoctoral advisor to identify what research projects and reagents you can take with you. It would be disastrous not to have this conversation. You want to have the best possible relationship with your advisor. He/she will write you letters of reference for your application and for any fellowship awards that you WILL apply for later, as a new faculty member.

The conversation you have with your advisor may surprise you. You may have (incorrectly) assumed that the project you have been working on is yours to take with you. Yet, your advisor may have other plans. Whether you think this is fair is beside the point. It is the advisor's lab and resources that helped get you to this point. It is their prerogative to retain a project in the lab. Because of this possibility, it is in your best interest to have this conversation with your mentor well before you plan to apply for a faculty position. The key items to establish are:

- what are your advisor's plans for your current project?
- if necessary, try to define directions for both of you that will not involve direct competition
- what reagents (i.e. a knockout mouse, a cell line, etc.) can you take with you?
- you may want or need to have similar discussions with collaborators

All of the preceding discussion will help you define a Research Proposal that your advisor will support and that you can discuss comfortably at an interview. At the same time, avoid (like the plague!!!) including collaborations with your postdoc PI (and probably your grad school mentor) for your future research proposal. The first years of your faculty position need to be geared toward establishing yourself as independent- as in independent from your postdoc advisor. Mentioning that you will continue to collaborate with your current advisor in your research proposal, your cover letter or during your interview is NOT a good idea. In addition, when you are evaluated for grants and promotion, continuing to collaborate with your postdoc advisor generally will be considered unfavorably and as a sign that you are not independent.

Crafting your Pitch

Basic research, mechanism, health, disease and therapies

Next, you need to decide how you will sell yourself. That is, are you a cell biologist? A cancer researcher? A microscopist? All of the above? How will you and your research program be sold to grant study sections? While basic research is great (and some faculty ads will specifically seek this), bio**medical** research is often funded because of a relevance to human health and disease. Therefore, if there is any way *(translated: FIND A WAY! It must, however, sound plausible and you definitely need to be able to translate this to a real grant proposal)* to link your research to disease or human health, this is the time to do it. Being a basic cell biologist vs. being a basic cell biologist with a focus on cancer is rarely a contest when members of the search committee read your application.

In my research proposal, I emphasized my expertise in imaging and interest in basic problems in endoplasmic reticulum biology. In retrospect, I think this emphasis on very basic biology weakened my application, as the connection to grant applications was less obvious. As an investigator, I emphasized my studies on aging, HIV, stress, and misfolded protein diseases and how my research provided new mechanisms and tools for these problems. In retrospect, if I had done this with my application, I suspect I would have been invited for even more interviews.

This is not to say that you must work on a disease. That's not a requirement. I've seen some proposals that have real value in basic research that would likely influence studies of disease. I've seen others where the claims are on shaky grounds. For example, if you wanted to use yeast as your model, as a cancer researcher, that is going to sound odd to some search committees. Yeast are single celled organisms. They don't exactly form tumors. If instead, you lead with the importance of cell cycle regulation as a key factor in cancer, you could pitch the use of yeast as a powerful system for identifying many key regulators and steps of the cell cycle. Today, there's a strong emphasis on studying cancer in mouse or even human models, so you'd probably want to describe examples of how yeast have been successfully used first to identify a pathway that was then shown to be conserved in mammals.

A second example is to say your findings have "implications for treatments." That's too vague. If you say your findings will lead to new treatments, that's a bold claim. Are you going to be personally developing and testing drugs or are your results going to provide new information about a pathway that is linked to disease progression? Both could be great, but set realistic expectations. If you claim you're going to make drugs and know nothing about pharmacology, clinical trials or high throughput screens, it will be quickly apparent to the search committee. Striking that balance with a concrete outcome, while not overreaching is a constant challenge in research funding and pitches.

Finally, it can be helpful to link your research to diseases in a broader sense. For example, you might highlight your pathway or molecule has been linked to several diseases. The mechanism of action may be unclear. Yet, working out the mechanism could help establish a disease mechanism, which in turn, could suggest new targets for therapeutic strategies.

If you research something fundamental, like learning, you could highlight the importance of this as fundamental neuroscience or psychology, yet it is also a question linked to development and disorders where learning is impaired or things need to be relearned after a stroke. Even if you are not using a stroke model, most scientists appreciate when mechanism can have application to solving health issues.

Stronger because of you

When thinking of yourself as a commodity, what is your expertise, especially in cutting edge techniques. You probably are an expert if you: 1) have first-hand experience with the methodology or technology, 2) understand how the method or equipment works and can troubleshoot when something isn't working, 3) have taught classes on the technique or have written reviews on the technique, 4) consult with companies to develop the technique or equipment, 5) have articles using the methodology. Note that I wrote "cutting-edge" techniques. Many schools look to new faculty to bring new expertise to their departments and to share it through collaboration. If you've got it, flaunt it.

A key point to convey is how your future research connects to your past training and accomplishments. Is the future research an extension of what you have been doing? Is it an entirely different direction that takes advantage of preliminary data and tools you have developed? How you address this question helps establish why you are the right (optimal or best) person to be conducting the proposed research.

Do put yourself into the proposal. If you only talk about research projects as a series of facts and problems, your reviewers will have a difficult time seeing what you have done and what you will do. There should be several references to your findings and specific contributions to the field. While you don't want to portray yourself as having single-handedly dragged your field into the 21st century, you do want to put your research contributions into the context of your field for non-experts.

Feedback and Iterative Refinement

Your research proposal is important enough that it should be critiqued by at least two people: someone grant savvy and someone who knows very little about your field, such as a significant other or someone from an unrelated lab can work well for the latter. The reason to consult the first person is obvious; the outsider is actually the more important one, since most people reading your proposal won't be in your field. Bury the search committee members in acronyms and minutiae, or skip the background needed to explain your questions, and you'll lose the reader's interest fast. Your proposal needs to be easy to read, understandable by anyone with a college degree in biology, and focused on the big ideas rather than the weeds. It matters far more that a reviewer knows you're developing an anti-cancer therapeutic against protein X in pathway Y than that they understand every component of pathway Y. You'll get to discuss the finer points later, in your seminar and chalk talk. Keep this "naive reader" test in mind for your grant proposals once you have your own lab, too. Conveying your ideas clearly is at least as important as the science itself.

A Role for LLMs or AI agents in developing your research proposal (and other documents)

Large Language Models or AI agents (such as Claude, ChatGPT, Gemini, which are popular LLMs in 2026) are potentially valuable tools for preparing and refining your application documents. Currently, LLMs are imperfect and require dedicated oversight to review suggested edits or even generation of text. LLMs can assist with editing grammar, structure, and logic in a way where word processors fall short. If English is not your first language, LLMs can assist with translations, as well as catching mistakes that bedevil nonnative speakers. At the same time, LLM generated text currently has a bad reputation. Many people claim to recognize LLM text by its structural features. For whatever reason in the training datasets, LLMs commonly employ em dashes (—), yet this is rarely observed in most human writing. Shallow reasoning, both side-ism, rules of 3, wordy vague text, and several other elements stand out in much AI generated text. When I used Claude to update the text of this eBook, I saw a plethora of em dashes, and semicolons followed by long lists used to replace short easy to read sentences. I didn't like those suggestions. Still, I found some suggestions very useful. For example, when I prompted Claude to help decrease repetition and make the text more succinct, I liked several suggestions.

I do not consider myself expert in my use of AI. Honing prompts and developing a workflow takes repeated use. I'm getting results that I find useful, but the process remains iterative and requires careful reading and evaluation of Claude's suggestions by me.

Let's consider some ways to make use of LLMs. First, in 2026, there's a range in quality for LLMs. I find that Claude Pro is much more robust and useful than say Microsoft Copilot or free versions of ChatGPT. Get the most robust LLM version available to you to assist with your writing. Next, you need to decide if you're going to let the LLM generate text. My decidedly Luddite view is to strongly encourage you to write the first draft yourself without the assistance of an LLM. You hopefully have some idea of what you want to say. Once you have a draft, keep an unaltered copy. It's helpful to remind yourself of what you considered important and to potentially learn from the LLM if it noticeably improves your document.

Now, consider prompts that will help the LLM help you. First, use the LLM as a critical reader. Prompt the LLM to evaluate your document as different types of audience. For example, "I have attached a research proposal for an assistant professor position in a cell biology department at an American medical school. Adopt the role of a full professor research scientist in cell biology. Please review this document for clarity, succinctness, and flow. Please identify use of jargon that may be unfamiliar, even to a PhD reader. Please identify elements of the proposal that are not helping answer questions or getting at mechanism. Please identify elements that are simply data collection, characterization or risky experimental screens of uncertain value. Please add comments and feedback as suggestions in an MS Word document, highlighted in red."

This prompt should give you considerable food for thought. You will probably see several suggestions that highlight confusing elements of your writing. That's OK. That's why we're doing editing before you share this document with anyone. As you review the suggestions, decide for yourself, what helps and what does not. If it is unclear why the LLM suggested a particular change or identified a problem, don't hesitate to ask for clarification. You might learn something about your ability to communicate your science or possibly that your ideas need further honing.

I applied this prompt in Claude (Opus 5) and got a big slab of humble pie. (See the Claude comments and suggested edits (page 100) following my own research proposal (page 98) in the Appendix. My own research proposal from 2003 falls prey to many of the issues that I coach job applicants to avoid. I suggest making your updates and revisions and then rerunning through the same or a similar LLM prompt. It's likely you will have substantially revised your pitch and proposal. You'll want to see if it is closer to the mark.

After you are reasonably happy with the LLM reviewed and modified version of your research proposal, you need to get feedback from an expert and a nonexpert. See above. You can go one step further and prompt the LLM to review your research proposal from the perspective of an undergraduate in a biology major or perhaps a professor in another discipline different from yours (e.g., you're in cancer cell biology and the LLM reviewer could be a professor of chemical biology or neuroscience). This perspective could simulate the 1-2 search committee members from outside the department and or a member of a broad category department like Biology. A major goal needs to be to make your proposal understandable by nearly anyone that reads it. Of

course, the proposal needs to be exciting, significant, and impactful. However, none of that matters if readers do not understand it.

Leaving AI behind for a moment, I also took a stab at writing a new example for an opening paragraph that has the elements that will help the ideas stand out. This example is not based on my own research and is not intended to be technically correct.

A hypothetical example of an opening paragraph that the author would write today.

Tumor cells pose the greatest threat to patients when the cells detach from the tumor and form metastases at distant sites. Surprisingly, healthy immune cells play a key role in the metastasis process by communicating with tumor cells with Epidermal Growth Factor (EGF). Blocking EGF signaling significantly inhibits metastasis. How EGF is delivered to the EGF receptor on tumor cells is unknown. This lack of information prevents us from optimally targeting and preventing EGF receptor binding. The leading hypothesis is that the immune cell (a macrophage) secretes a gradient of EGF that finds the tumor cell. However, macrophages are often several cell lengths away from tumor cells, which dilute EGF to a possibly insufficient signal density. Also, I have preliminary data revealing that macrophages do not secrete detectable amounts of free EGF into cell culture media. An alternative hypothesis is that novel finger-like membrane structures, nanotubes, extend from macrophages directly to tumor cells, touching the tumor cell and delivering EGF in a highly concentrated manner. Whether diffusion or nanotubes communicate with the tumor will determine what types of therapeutic strategies could be developed to block the process of metastasis. As a postdoc, I have developed reagents and fluorescence microscopy methods to visualize delivery of molecules by both pathways both in culture and in live animals. My future lab will resolve the long-standing problem of how immune cells communicate with and influence tumor cells in live animals.

Breakdown of hypothetical example

The important ideas in this paragraph include what the high level problem is (metastasis/cancer), the question I'm going to focus on (how immune cells communicate with tumor cells to induce metastasis), why this is a significant question (not just that it's cancer, but rather that the mechanism of communication is going to determine what kind of therapy will be able to disrupt communication), why me (my preliminary data and the tools I have developed), plus a clear idea of what the answer could be. This last point is very important. You do not want to say your research will "increase understanding" or something equally vague. You don't really want to say the thing you are working on is "understudied" because lots of things are not studied. That's not a justification to start studying something. There needs to be a clear value to choosing to study your problem vs. all of the other things out there that could be studied. Or put more bluntly, why is YOUR problem a better bet for the department to invest in than the problems the other candidates are studying? Remember, you are being hired for your future research program. Your track record as a postdoc speaks to your potential to be successful. You are now trying to convince the search committee that you've got a problem that the search committee will want to see successfully solved.

Additional advice on writing research proposals can be found at:

Austin, Jim. “Writing a Research Plan.” Science: Careers. 9/26/2002.
http://www.sciencemag.org/careers/2002/07/writing-research-plan

Chapter 4. Applying for Faculty Positions

Now that you have your application materials prepared, you are ready to begin applying for faculty positions. The actual process will be time intensive, as you will need to be exhaustive in your search for ads that appear to be a good fit for your research and teaching interests. In addition, your application is not static. You probably need to modify your application to fit with a job description.

When to apply?

Ads for faculty positions are posted throughout the year, but there's a definite recruitment season in the US. It generally begins in August, when the number of faculty position ads starts climbing on the *Science* and *Nature* career websites (see below), and continues heavily through late November and December. Many applications become due around this time too, usually December or January, though some are due as early as mid-October, which is why you want to start working on your application materials no later than July (and preferably do a chalk talk before that. See Chapter 5.

A quick note on application deadlines: as the name implies, these are the latest times you can submit, not a target date. Don't wait until the deadline. Committees often start scheduling interviews as soon as they see excellent applications, and you want to be in that first round. Your application gets more consideration and more enthusiasm before the committee starts to burn out. Many search committees plan to interview only 3-6 candidates total in person. Some schools even count on getting their top candidates well in advance of other institutions. While there are some pros and cons to consider regarding that approach, you want to be prepared to send out a well-crafted application in a timely manner. As noted earlier, you have already invested several years of post-college training to get to this stage. Why submit anything less than the best application you can write?

To finish with the general application process timeline, interviews will begin as early as November and can run through April, though most finish in March. Second interviews usually happen between February and May. Letters of offer will be sent within days or a few weeks of the second interview (or even after the first interview at some schools). You typically have two weeks to a month to negotiate and respond to the letter of offer, though negotiations can go on for several months in some cases. Most positions will begin in August or later depending on when space is available and when (and if) you are expected to do any teaching. Thus, the entire process takes about a year, plus a few extra months during which you will prepare your application materials.

Where to Look for Job Postings?

There are five major sources of information concerning biomedical sciences faculty position openings:

- Journals- *Science*, *Cell*, and *Nature* list the majority of faculty position recruitment ads. The career advertisement websites for each journal are searchable and updated weekly or even daily. Using search terms can help narrow down the number of ads you have to sort through, but you may miss an opportunity because the ad doesn't contain one of your search terms. I used a rather obsessive approach. I searched each website at least once a

week. I also subscribed to *Science* and went through all of the faculty recruitment ads. I did find a few ads that I had missed in my online search.

- Specialty journals- ASCB has a website with job listings. It is not as extensive as *Nature*/*Cell*/*Science*, but sometimes posted an ad before some of the other sites.

- Meetings- Check job boards at meetings. There usually aren't very many jobs advertised. However, because you attend meetings in your research areas, the job postings may be particularly relevant to you.

- Job postings in your Department- Many job search announcements are sent to department chairs or colleagues to identify suitable candidates. These letters or announcements are often posted on a job board in your department. While the number of postings is usually small, as with meetings, the job announcements are likely to be highly relevant to you.

- Word of mouth- It is a very good idea to let your colleagues know that you are on the market for a job. Sometimes, jobs are advertised by word of mouth. I found out about two job opportunities in this way. Also, when your advisor is at meetings or seminars, they may hear about an opportunity or can put in a good word for you.

-If you have any inside connections, use them. Let them know you are applying for the position and ask them to contact the chair of the search committee to put in a good word for you. Never underestimate the power of networking.

Additional resources include The Chronicle of Higher Education (http://chronicle.com/jobs/), though these listings skew toward teaching-focused positions with less emphasis on research. I've also found postings directly on department websites, though those are sometimes out of date or duplicate what's already posted in *Science*. In general, focusing on *Nature* and *Science* should connect you to most biomedical sciences faculty openings.

Here are some of the most popular:

- http://chroniclevitae.com (see jobs tab)
- http://neurojobs.sfn.org/jobs
- http://www.nature.com/naturejobs/science/
- http://jobs.sciencecareers.org
- https://jobs.ascb.org
- http://careers.nationalpostdoc.org
- http://chemjobber.blogspot.com/
- https://www.training.nih.gov/career_services/jobs

Choosing which ads to respond to

As you review job ads, you may find well over 1,000 postings for biomedical sciences faculty positions. Unless you're willing to customize your application a thousand times and drive your letter writers crazy, you need to narrow that list down considerably.

Step 1. Identify the ads for which there is no match with your skills. If the ad clearly states that the department is seeking an NMR specialist and you work on *Drosophila* genetics without an NMR component, there is little point in applying to this ad.

Step 2. Identify places that you and your spouse/partner absolutely would not consider. Be careful here as you may be pleasantly surprised by some places. I grew up in a small town on the south coast of Oregon. Having never been in the Bronx and having only heard the horror stories about the south Bronx (in the 1970s), I had no interest in working there, much less living there. What a difference a visit can make! I became a professor in the Bronx at a Medical School in a safe working class Italian neighborhood. What's more, much as I love Manhattan, my wife and I chose to live in the Bronx. Who knew that we could find a single-family house with a yard and driveway in a small quiet seaside community that is part of New York City?

There are other considerations. First, would your significant other be able to find a job in the area? Unless you are wealthy and your spouse plans to be stay-at-home, this is a very important consideration. Though, with remote work options, this may now be less of an issue. In one place that I interviewed, I met a couple of faculty whose spouses could not find jobs in the area. This caused marital and financial strains. Second, how important is it to you to be able to hire postdocs? Schools in metropolitan areas will be able to attract postdocs and you will often have a pool of existing grad students that will become postdocs in the area. Postdocs are often married to postdocs and spouses will often seek jobs once the other spouse has found a job in the area. These individuals can be an important resource for new faculty. Finally, if there are places that you or your spouse absolutely won't live, don't apply to those places.

Step 3. Do your homework. After Steps 1 and 2, you'll likely still have a hundred or more ads left. Now it's time to educate yourself about the specific institutions and departments. Department and faculty web pages are surprisingly informative, though can be very out of date. Even worse, some faculty and department pages are from a past iteration and can still be searched and found on the web. If things look seriously dated, try extending your search for more up to date pages. First, look at which journals the faculty publish in; a department where people publish infrequently or in low-profile journals is unlikely to be research-intensive, though bear in mind that publishing metrics are shifting: preprints and a growing backlash against journal impact factor (a poor proxy for quality) are changing how productivity gets evaluated. Still, publication frequency can hint at how much time and resources faculty have. You can also check faculty and institutional NIH funding through the NIH RePORTER database (https://reporter.nih.gov) — if a search turns up only a couple of names or grants, most of the department isn't NIH funded. An NIH grant isn't the be-all-end-all for every STEM

faculty member, but it's a gold standard in much of biomedical research; in other fields, look for NSF (https://www.nsf.gov/awardsearch/), DoD, DoE, or foundation funding (e.g., the Howard Hughes Medical Institute). A department with a weak funding record can make it harder to secure your own funding. Some grant reviewers explicitly weigh the suitability of the host institution, and I've met people whose grants were dinged because their school wasn't seen as a research institution. Remember that schools view you, bluntly, as a future source of revenue as well as a future colleague, and most will expect you to bring in grants that cover overhead; if most current faculty aren't NIH funded, that expectation may not be realistic for your field. One more thing worth knowing, courtesy of my mentors at the NIH: an R01 is portable. If you land a position, win an R01, and later decide to move institutions, that grant gives other schools a real reason to want you.

A department website can tell you other important things too. For example, if most faculty pages list courses taught and office hours, that's a signal the department carries a significant teaching load.

Look closely at the research interests of the faculty. Do other people have research interests that relate to any of yours? I found one department in which almost everyone worked on aspects of cardiac function. I didn't think this would be a good fit with my research interests in cell biology of the secretory pathway. Alternatively, some departments are general biology and there may only be one or two cell biologists (for example) in the department. Will this be an sufficient peer group for you? Remember that your daily interactions will be in your institution and if you are the only cell biologist (again, for example), you may not have many people to bounce ideas off of or who can give you feedback on a manuscript or grant proposal. In addition, you will need people each with different expertise to collaborate with you on your research or to operate core facilities. Finally, never underestimate the convenience of being able to borrow reagents or equipment from other members of your department. That said, do not constrain your investigation to just the department of interest. Maybe there are potential colleagues or collaborators in other departments. For example, while I'm a cell biologist, I had many collaborations with faculty in Biochemistry.

Now focus on the assistant professor web sites in particular. What kind of publications and how many do they have? Look especially at publications in which they are not the senior author. These are likely to be publications from their postdoctoral research. This is a potential window into what kinds of expectations the search committee will have in terms of publications. If your CV is far outside of the publication records of the assistant professors' postdoc years, the institution may not be a good fit. That is, if the assistant professors have multiple papers in high profile journals, the search committee probably has high expectations. However, as noted in Chapter 1, there are multiple pathways to getting a faculty positions. For example, your expertise in a new technology may trump your relatively few publications. And absolute number of publications is only one component by which one is evaluated.

Many departments post their seminar series. Do many speakers visit the department? Are you likely to be interested in meeting with these speakers? Remember, as a faculty member, you will often meet with visiting seminar speakers for upwards of a whole hour. Also, invited speakers are your chance to hear about the rest of the research world (when you aren't attending meetings).

Look at department/institution facilities. Many departments will have links to core facilities and may highlight special equipment in the department- confocal microscopes, mass spec, supercomputing, etc. If the department/institution lacks resources, this could affect your research program. On the bright side, some departments are seeking to expand their resources and hiring you may be part of that process. I applied to several departments seeking to expand their microscopy expertise. The departments were waiting for a new faculty member to specify the type of microscope before purchasing one.

The last thing to notice is the ratio of assistant to associate and full professors in the department. If there are only full professors, you may be the only young person in the department. This is not necessarily any sort of deal breaker. There are several potential explanations for the imbalance and it is worth inquiring about, should you get an interview.

In the end, imagine yourself in that department. If you have a difficult time imagining yourself fitting into the department, then it may not be right for you. That said, websites are not always frequently updated and this version of the department may be out of date. New hires may not yet have started. Therefore, my suggestions for evaluation should be taken as one way for you to gather data. If this is a place you think you want to be, then dig deeper and talk to someone who can answer your questions.

After reviewing department websites, you should have a good sense of where to apply, even if the list is still long. People often ask how many places they should apply to. I applied to 75 and got eight interviews and six job offers; one colleague sent out fifty applications and got 20 interviews and 12 offers. Some people applied to a single job and got it (very rare). My rationale was to maximize my chances and increase my options. Hundreds of people apply for any given position. Some of your competitors will be stellar. Some departments are looking for something specific that isn't spelled out in the ad or may find you scientifically strong, but too expensive to hire. Once your application materials are assembled, tailoring each application is relatively minor effort for another shot at the lottery. For perspective, the job you are applying for will be your job for the next 5-30 years. An extra hour to tweak and target your application is a small amount of effort. Ultimately, in this faculty position lottery, 50-75 tickets is probably the practical ceiling that you can target. Even with AI tools as an option, I don't recommend having AI automate a huge number of applications. You want your application to sound like you and there is probably a limited number of places where you would want to work.

Organizing your application files

Keeping track of 50-75 applications requires some organization. It is important to know what you sent, when you sent it, and to remember what job you applied for. My low tech system consisted of clipping each ad from Science or printing an internet posted ad, taping or pasting it to a manila folder, and then indicating on the folder dates of actions, such as sending materials, requesting letters of reference, etc. For those of you that are less analog than me, a spreadsheet tracker with columns for institution, position, deadline, materials sent, etc. would be helpful. You may ask why have a folder?, if all you did was submit materials. The folder is needed because you will receive materials back from the search committee. No, not your rejected application! You will get an email acknowledging receipt of your application and indicating whether you are missing any

materials- usually a letter of reference. If everything goes well, you will also fill the folder with correspondence, interview schedules, acceptance letters, etc.

Tailoring your application

Now that you have narrowed down which ads you will respond to, you will need to tailor your application. At the very least, you will need to modify your cover letter to indicate which school and job you are applying for. To make your application more attractive, you will want to respond *specifically* to the ad. For example, in your cover letter you may have chosen to emphasize your work on organelle biology. However, a particular ad is seeking someone with expertise in cell biology and modern imaging techniques. For this ad, you will want to include a few sentences in your cover letter mentioning that you use quantitative imaging, FRET, FRAP, etc., to address your research questions. In addition, you would want to modify your research proposal to add a few sentences mentioning how you have used imaging techniques to address your questions and how you will incorporate imaging into your future research. For another example, an ad is seeking someone with a focus on cancer biology. Your proposal highlighted the basic cell biology of your research and that there is a potential relevance to cancer. If you want to apply to this ad, you will need to develop the relevance to cancer angle. Conversely, if the ad is more focused on basic cell biology, you should consider emphasizing the mechanism in your system and that there is a relevance to cancer. As mentioned in the section on your research proposal (Chapter 3), it is generally a good idea to emphasize expertise with technology and disease relevance no matter what ad you are responding to.

In some cases, you'll want to overhaul your application more extensively, especially when applying to a position with a heavy teaching load. There, you need to emphasize your teaching experience and abilities: in your CV and teaching philosophy, highlight how many students you had per class, how many lectures you gave and how often, which textbooks you used, whether you co-taught or ran the course yourself, any teaching evaluation metrics, and any particular styles (team-based learning) or technologies (electronic clickers, Slido, Canvas, etc.) you used.

Another way to help your application standout is to match your references with the research focus in the ad. That is, you may wish to select referees depending on their expertise and reputation relative to the expertise sought in the ad. For example, say that you find an ad that is seeking an expert in confocal microscopy. If you have a collaborator that is well recognized in live cell imaging and the collaborator can write about your skills as a microscopist, this collaborator would be an excellent choice for that ad. It is more likely that someone on the search committee would recognize your referee and that could enhance your chances of getting invited for an interview.

Sending the applications

Once you have tailored your application, you can now prepare to send the application. First, check the ad very carefully to identify all of the requested materials. I underlined every requested item and checked them off as I assembled the applications.

Second, you submit your application by email or a website portal. Make sure you read carefully what format your application materials need to be in, e.g., PDF, MS Word, etc.

Follow-up

Once you have sent your application materials, check off on your list that you submitted an application to each institution on such and such date. You should receive confirmation of receipt of your materials. Most portals will contact your referees for letters of reference. If not, do follow up with your referees to confirm when letters have been sent. Then you play the waiting game.

You may be surprised to learn your application still isn't really complete. Until you get a rejection letter, keep the search committee updated on relevant progress, such as a manuscript acceptance, a posted preprint, a prestigious award, or a new grant. Once you have one of those types of accomplishments to report, it's fine to mention smaller accomplishments alongside it too: a meeting talk, a middle-author manuscript, a travel award, an invited talk (though not other job talks!), attending a workshop, etc. Send these updates by email or through the application portal, formatted similarly to your cover letter. See **Appendix F.**

Chapter 5. Rejection

Unless you have a stellar CV and happen to be a perfect fit for every search committee, you will receive rejection letters. This isn't necessarily a rejection of you or your science. Rejection letters mean other candidates better matched what that particular committee was looking for, whether that's more publications, a specific expertise, a personal connection to someone on the committee or any number of other factors.

Getting rejected is disheartening. Getting rejected a lot is downright depressing. But it's a matter of perspective. I applied to 75 jobs and got 67 rejections. More importantly, I got eight interviews, six offers, and a job I loved. Applying for a faculty position is a lot like screening bacterial colonies for a successful clone. Really. You only need one positive colony for the experiment to work. If you're not a molecular biologist, think of it as buying 75 lottery tickets and having one of them win. You could dwell on the 74 losers, but that's a rough attitude for a career in science.

Not all rejections will be impersonal form letters. One department chair sent me the nicest rejection I've ever received. The chair was extremely apologetic and praised my credentials. The chair wrote that the school had recently invested in a new facility and needed researchers with a specific expertise appropriate for that facility. Because my research did not fit with the goals of the new facility, the search committee wouldn't be able to further consider my application. Life would be easier for everyone if search committees are more transparent about goals for the hire. Having now served on search committees, I can confirm that we get some excellent applicants that don't fit with what the committee is seeking.

What if the worst case happens and every one of your applications is rejected? You *could* curse the charlatans and frauds that failed to recognize your genius and go start a lab on a deserted island and plot the overthrow of the world governments and the destruction of your nemeses. This has a certain appeal, but then you would have to deal with the inevitable James Bond types and the villains (that's you) usually don't fare too well in these struggles.

Fortunately, you have a few real options. You could give up on a faculty position and pursue a different career path. PhDs have incredibly low unemployment rates. Your degree can open up a lot of opportunities. Plus, it's valuable to remind yourself that relative to the number of PhDs or even postdocs, Academia qualifies as an "alternative" career.

You could send out more applications, which costs nothing but time. More productively, you can seek honest feedback from several people to improve your application. Talk to your advisor about preparing more manuscripts. Ask people at your current or graduate institution what search committees are actually looking for and have them critique your full materials. Consider a second postdoc to strengthen your record or gather more preliminary data for your research proposal. Pick up some teaching experience, and apply for transition awards, which can provide leverage when you start your own lab. In short, build a practical strategy that makes you a measurably stronger candidate the next time you apply for faculty positions.

There is an important scenario that needs to be discussed here in the rejection chapter. What if you get interviews, but don't get a job offer? Each case is obviously unique, but there are a couple of ways to view the rejection. If you only get one interview

and don't get an offer, you are probably a borderline candidate. You have some excellent qualities, but other candidates can offer a more complete package – more and better publications, transition award funding, greater expertise, more experience, etc. Take the interview invitation as encouragement, apply for more positions and strengthen your application in the ways suggested in the preceding paragraph.

If you get several interviews (three or more) and do not get a job offer, then you have a couple of different concerns. You may still be a borderline candidate, but the evidence of multiple interview invitations argues that you ***are*** a desirable candidate on paper. You definitely need to improve your interview skills and need to get some constructive feedback on what you aren't doing well enough with your chalk talk, job talk or maybe even interpersonal skills over dinner or during one-on-one meetings. I still remember a candidate that looked great on paper and then we had our one-on-one meeting. I began trying to tell him about my cell biology work and he cut the conversation short by stating he was NOT a cell biologist. Note, he was not inviting me to explain my system to a non-expert. He was terminating the conversation as irrelevant to his science or interests. In other words, he woefully failed the potential future colleague test. Other failure modes include saying disparaging things about one's colleagues (you'll probably say the same kinds of things about future colleagues at this institution, too), a naïve or boring chalk talk, treating people like grad students or administrators like inferiors, or just not being ready for prime time. One candidate given some suggestions for his research program by one of the search committee members. The candidate liked the advice and then said with a completely straight face, "If I don't get this job, can I come to your lab as a postdoc?" The candidate had been doing pretty well, but that comment completely undermined his credibility as being ready to be a professor. Hopefully, the strategies described in the next section will help you be well prepared to come across strongly in your own interviews.

Chapter 6. Job Talks and Chalk Talks

The Job Talk and Chalk Talk are make-or-break events for you. These are the only opportunities that some faculty may have to see you. These events will tell the search committee several things about you:

1) Can you articulate your plans for your future research?
2) Does your research appear to be fundable?
3) How well do you understand your own research and can you relate it to other fields?
4) Can you answer questions clearly and thoughtfully?
5) Can you teach? Can you explain your research to non-experts?
6) How well do you perform under pressure?
7) Are you interesting and enthusiastic?

How to Prepare and Deliver a Job Talk

The key to an outstanding job talk is to ensure everyone understands what you're doing, why you're doing it, and how you plan to advance your research in the future. Most candidates get the "what" and "how" more or less right. The "why" is where talks often fall apart. If you assume it's self-evident that your research is brilliant, a boon to humanity, and simple enough for a child to grasp, you're in for a shock. You'll be presenting to a department with diverse research interests, plus far less experienced postdocs and grad students. Even if everyone technically works in the same subfield, don't assume they know your specific methods, your research focus, or why they should care about it.

Just as important, you need to engage your audience: make them interested in your research and hungry to know more. Own your subject. Make it clear you're an expert who understands how your work relates to other fields, especially those of the other faculty in the room. Convince the audience you'd be an asset to the department: someone whose research, expertise, and fundable future work would make an outstanding colleague.

The Job Talk

Your seminar should be able to introduce a broad audience to your topic. Remember, members of your audience may be unfamiliar with your research area. In addition, you will be judged on your ability to convey your message and teach. A clear presentation is expected. How to give a clear presentation is something you have hopefully already learned. Below I provide some reminders and suggestions that may be helpful when talking to an audience that is probably more diverse in backgrounds and interests than you may be used to.

1. Introduction: You can make your audience much more comfortable by providing sufficient background for understanding your research. Have at least 2 or 3 introductory slides. Start broad and then focus. This background should include the following:

a. Frame the big picture. If you work on G-proteins and say that you are most interested in members of the X subfamily, that IS NOT the big picture. Let the audience members know why they should care about your research. Are you working on

something relevant to disease or fundamental biology? Start at this level and then relate your problem to the big picture.

Start with big questions: Regulation of cellular processes is essential for cellular homeostasis. Understanding the mechanisms responsible for regulation is critical for understanding cancer/disease x/development/etc. Process X is important because.... A key regulatory component of process X is Y, a 7 membrane domain G protein.... This part of a larger family etc.

Job Talk Introduction Example 1.

I work on family members of the X family of G-proteins that are important for cancer.

These proteins are homologous in the P and N regions.

We made mutations, etc. etc. etc.

Job Talk Introduction Example 2

Understanding the biological basis of breast cancer can help in identifying biological markers to detect breast cancer earlier and will hopefully identify new therapeutic targets.

As with all cancers, regulation of the cell cycle is fundamentally altered in breast cancer. [Include slide briefly outlining cell cycle and cancer cell entry into an overactive cell cycle.]

Work in our lab and in others has demonstrated that a family of signaling proteins, the X family of G-proteins, are necessary for escape from normal regulation of the cell cycle in breast cancer.

The general characteristics of G-proteins are A, B, and C.

The X family members share homologous sequences in the regions termed P and N.

To determine how these proteins promote escape from a regulated cell cycle in breast cancer, we made a series of mutations in the P and N regions.

Example 2 is obviously more detailed. More importantly, the average biologist has a chance of reasonably following this version. Example 1 only makes sense to experts in the X family of G-proteins. The goal isn't to dumb your talk down or over-explain, but to give everyone in the room, grad students and faculty alike, a real chance to understand why you care about your research, and why they should too.

Another way to begin a talk is with a commonly understandable story or analogy. If everyone nods in recognition (they can identify with that situation, they get the point), they'll have a frame of reference for your research problem, they'll be more engaged. It is very important to test stories and analogies with naïve audiences, as the story could be too long, too obscure or missing key information that helps listeners make the connection.

A last point on the introduction is that you don't want to overwhelm your audience with background either. The theme of your talk, the questions you are interested in, the significance should all be delivered in the first few minutes of your talk. Providing a lot details and background can cause your audience to lose track of your story. They

may be unclear on what they are supposed to remember or how things are supposed to fit into the story. Early career scientists often have a fear that people need to know ALL of the details or the presenter's research will be judged insufficiently scholarly. Definitely not true. Remember that the audience will generally credit you with being an expert (until proven otherwise). You need to provide the key details that set up the story, not 30 minute review of the history of the field. Despite your urge to supply details, keep asking yourself what information advances the story and what information is not contributing to the story.

2. The Body of the Presentation: You're going to tell a key story from your postdoctoral studies. I suggest minimizing the urge to tell multiple stories. Multiple stories can work in some cases, but generally, you want your audience to be able easily follow and remember what you worked on successfully. The things I most often suggest are:

- Set up each experiment. Start with the question. State the anticipated outcome/answer. Then tell the audience how you tested the idea (the actual experiment). First show the control outcome, then show the outcome for the question and compare and contrast. Why? If you want to say, "we were surprised by this outcome," you want the audience to be surprised, too. Remember, they did not do the experiment and probably are not in your field. It's not going to be a surprise if they do not know what was expected and why. Finally, state what you concluded from the experiment and this then led you to…. Next slide.

- Minimize text. Make sure everything is big enough to read from the back of the room. Label your axes, provide legends for graph components, and make your message easy to connect straight from the data. A figure from your paper may be the most complete way to explain something, but that doesn't mean that figure belongs on a slide. The paper figure version may be too dense for a talk.

- You'll cover a lot of ground in your talk, but that doesn't mean your summary slide (or any slide) should be a wall of paragraphs. Keep words to a minimum and think in sound bites; if you have a long sentence you want to say, memorize it rather than putting it on the screen. Better yet, replace a text heavy summary slide with a model or graphic. Visuals instead of words can convey your point more effectively. Plus, you can still say out loud whatever you would have written.

- Future Directions. Your talk will need to include at least five minutes related to future directions for your research and a brief(!) description of what you will do in your first few years as an assistant professor. Some people will not be attending your chalk talk or there may not even be a chalk talk (see below). Make sure your future directions make sense in the context of your talk. If your future aims are a completely different project, then make sure you have enough time to provide a brief introduction to the new project and then explain what the important questions are and how you will address them.

- Acknowledgements. This slide is almost always abused. Clearly there are a number of people that you work with and that contributed to your project. Generally, your audience doesn't know these people and, frankly, doesn't care. You don't need to read off everyone's name. To cut down on your presentation time and to avoid boring your audience, you can abbreviate the acknowledgements by displaying the slide and stating, "This work was performed in the laboratory of *your PI* and in collaboration with a key *collaborator's name*." Also, DO thank all of your funding sources.

3. Slide Design

Use a sufficiently large easy to read font- Helvetica, Arial, Times in 16 point or larger.

Restrain your inner PowerPoint artist and keep slides simple. Avoid fancy backgrounds and elaborate layouts, both of which distract more than they help. Be careful with color: red lines or fonts on blue or black are difficult to read, while black on white or yellow/white on blue or black work well. Other combinations can work too, but keep in mind that some audience members may be colorblind. For more on color choices and other presentation tips, see Naegle, K., "Ten simple rules for effective presentation slides," *PLOS Computational Biology*, 2021 (https://doi.org/10.1371/journal.pcbi.1009554). Also, see https://support.microsoft.com/en-us/powerpoint/tips-for-creating-and-delivering-an-effective-presentation.

Avoid filling slides with more than one big idea. Only include information/data that is needed. Do NOT cram your slide with text or too many pieces of data. Make the effort to tailor your slides. Slides made from a paper figure that includes something you're not going to cover are bad slides. This is a talk, not a journal club. You should make the figure that you need, not just a figure that fills space or sort of addresses your point. The figure should be easy to understand. Your viewer will only get a few seconds to a minute to try and understand your figure. If it's too complicated, you will lose your viewers and you will have a sleeping audience or people reading their emails. I've frequently heard the advice that no one ever complained about slides being too easy to understand. While I do not have space to go into all of the details of slide design, I can think of at least three common examples of slides that are unnecessarily complicated.

i) FACS analysis slides or some other data slide where presenters wallpaper the slide with numerous experiments. Inevitably, speakers will put from six to 20 (!) FACS profiles (or other experiments) on the same slide. Your audience will rarely be full of FACS experts and even the experts like to be able easily see and evaluate the data. The more experiments per slide, the more potential for confusion. Limit the number of profiles so that your audience will know exactly which profile you want them to focus on.

ii) Tables. Tables from your journal articles don't necessarily work well for slides. Usually, there are too many columns, which often are not important to your talk. It is well worth your time to simplify your tables. For example, including n, the actual p value or other details of statistics is rarely necessary. A simple * for statistical significance is usually adequate.

iii. Figures taken from papers or someone else's presentation. These figures may contain information irrelevant to your talk. If you find yourself saying "This is a busy slide, but you only need to pay attention to this part in the lower left hand corner…." Do your audience a favor and make a new slide. Ditch the irrelevant content or even better, develop a figure that best tells your story and points. With newer illustration tools like BioRender or even AI tools, there's little excuse for less than well focused professional looking slides.

Finally, absolutely, positively, without fail: reference every piece of material in your slides that isn't originally yours. A figure you didn't make, someone else's data, something from a labmate's lab meeting, anything you pulled off the web. Reference all of it. Don't be a data thief, and don't leave any doubt in your committee's mind about where you stand on plagiarism.

4. Managing Questions: During your training as a graduate student and a postdoc, you have gained experience handling questions from the audience. Here are some general reminders and pointers.

Anticipate questions. What's most interesting or most controversial about your work? Does your work conflict with findings from another major lab? If so, be ready to explain what validates your approach, and be careful not to be derogatory about groups with a different viewpoint. Your audience may well include their personal friends.

The most important aspect of answering questions is that you do it gracefully and that you can make the questioner feel like he/she asked a good question, no matter how goofy the question might be. For example:

Good introductions for your responses:

That's a great question!
You raise a good point!
I hadn't been thinking along those lines, but that's an interesting idea.

Sometimes, you'll get an odd question that you have no idea how to answer. To make you and the questioner look better, try to get at the real question. For example:

Let me rephrase your question to make sure I understand it.
That's an interesting idea. Could you expand a bit on that?
I have to confess that I'm not familiar with that cell type, protein family, etc…
Could you expand a bit on how you are thinking about this problem?

Silence is not golden during your talk. Frequently (and hopefully), you will get questions during your talk. You should not be phased by this. Remember that anyone asking

questions is paying attention. No questions may mean no one cares or no one understands. You need to be comfortable with being interrupted during your talk. Practice, if needed.

Hostile or aggressive questions. Rarely, a questioner will ask questions that are not friendly. The question may be intended to test you or, even more rarely, to even humiliate you. I mention this to note that it can happen. Some questioners are inherently grumpy people, but others may have ulterior motives. In some cases, the questioner may even be competing with you for the same job. I've seen it happen. The key is not to get upset and not to get drawn into an argument. You need to be professional and mature. Be gracious with a response that thanks the questioner and then just answer the question as best you can in a dispassionate manner. The audience will see that you are calm and the hostile questioner is being a jerk. This happened to me during one of my interviews. I took the aggressive questions in stride and afterwards, the members of the committee apologized profusely to me regarding the rude questioner. Remember that most interviews are a two-way street. The committee is evaluating you, but they are also trying to recruit you. You would be unlikely to accept an offer if you had an exceptionally negative interview experience. Most committees are (or should be) aware of the importance of portraying their institution in a positive light.

Excessive Questions. Sometimes, there are too many questions during your talk. Frequent interruptions can cut into your talk time. A few questions are OK and you should anticipate them when planning your talk. This is one reason a 45 minute talk can be a good way to absorb questions without cutting off your story. If you start getting a large number of questions, you could run out of time. Politely ask if you can defer the rest of the questions until the end of the talk because you recognize are short on time.

Job Talk Preparation

Ask your contact during the initial phone or zoom interview (see Chapter 7) if there is any particular aspect of your research or expertise that caught the attention of the search committee. This could be a direct clue as to what the committee will want to hear about in your job and chalk talks. For example, our department held a search for candidates with expertise in imaging and microscope building. Many of the candidates directed their talks almost entirely towards their biological questions and glossed over their ability to develop microscopes, the mechanics of their instruments, and their future plans for microscope development. While the candidate seminars demonstrated strong biology, they failed to discuss what the committee was most interested in learning about the candidates.

Practice your talk until you're comfortable giving it. If you're relaxed, the audience is more likely to relax too. Practice your talk at least a couple of times in front of a naive audience: your PI and labmates are a fine start. However, your real audience will be unfamiliar with your research. It is vital to get feedback from people in another department, or even nonscientists. Your talk has to work for both experts in your field and people working in different areas of science. I gave my cell biology talk at one

institution to an audience that included experts on songbird neurobiology, snake feeding behavior, and fish development.

The feedback you need is whether your talk is interesting for and makes any sense to a naïve audience. Many people want to be encouraging or suggest minor changes that do not get at fundamental problems. You need explicit feedback from people who can be candid and constructive. It is not always easy to find such people, but you should make the effort to find them. The same type of people will be valuable for evaluating your grant proposals when you start your faculty position. Ask your test audience to specifically comment on:

- Is your talk interesting?
- Is it clear what you are working on and why this is an important problem? Is your Introduction clear?
- Are your slides easy to understand? Are the images easy to see? Are there too many ideas or words on your slides?
- Does your talk seem rushed?

Note that asking for feedback on these things in a way that one can answer yes or no is not helpful for you. Get detailed responses. Ask your feedback providers to describe what they like, what does not work, *how* something is difficult to understand, etc.

Time your talk so it finishes well before the hour is up. If you go over, people will start leaving for other meetings. Aim for a comfortable 45 minutes that leaves room for questions during and after. Your talk shouldn't feel rushed to cram in 60-70 slides. Keep in mind your talk will rarely start exactly on time: hosts typically wait about 5 minutes past the posted start, then spend another minute or two introducing you. Nobody cares whether you technically got a full 60 minutes. Audience members care about reaching their next meeting on time.

Nobody will complain if your talk is less than 50 minutes. I did attend one job talk that was only about 35 minutes. That was awkward and ultimately bad. Many members of the search committee concluded that the exceptionally short time indicated that the candidate had not accomplished much as a postdoc. After 3-5 years of being a postdoc, hopefully your dilemma is making your talk fit into the allotted time, not trying to figure out how to fill 45-50 minutes of time.

Movies

Movies are a double-edged sword. Including movies in your talk will automatically attract the attention of your audience. Our eyes are naturally drawn towards movement. If you are a microscopist, movies show off your imaging skills and often convey more dynamics that are not always apparent in a static series of images from the movie. If you have a lot of static images, a movie of your model or of a mouse phenotype, can break up the monotony of slides of words, tables or gels. However, deciding to include movies in your presentation comes with a price. The movie will eat up presentation time and more importantly, the movie may not work. Still a problem even in 2026. If the movie file is large or you are running your presentation from the cloud or a portable hard drive, your movie may not be correctly linked to your presentation. Obviously, crashing your presentation or failing to run the movie is not going to impress your audience. Therefore,

test your presentation under various computer conditions that you are likely to encounter: on your laptop, transferring your talk to another laptop from the cloud or portable hard drive, and on an alternative operating system. The final test is to run through your slides and movies immediately before your talk. Run the talk in "slide show" presentation mode, not in the "normal view" mode of PowerPoint. Test whether ALL of your movies will play. If not, take them out and improvise. You can also prepare a static series of images slide to use in place of your movie if there are any concerns with a particular movie.

Images and System Compatibility

Test your talk on other computers to make sure that your images and files can be read. Mac PowerPoint presentations can have issues with PC computers. If you use an Apple computer (Mac) or PC, then you may find that certain images in your PowerPoint presentation will not display properly between the two systems. System resolutions can also affect your slides.

For the reasons described above, it may be worth preparing both a PC and Apple version of your talk (if you use Mac, otherwise PC alone should be OK). Test this before traveling to your interview. Your laptop could fail and if you have to put your talk on a PC.

If possible, practice your talk with a remote slide advancer/pointer. You may wish to purchase your own. Knowing how to advance or reverse your slides and start your movies has a significant impact on the impression you make- confident and capable vs. flustered and technologically awkward. Seriously. This little item can be purchased for $35-50 and mastering it before your job talk can help you focus on the content of your science instead of having a bad presentation where you keep accidentally turning off your slides! Don't forget back-up batteries. Be wary of using the host's slide advancer because it may work differently from your own and you could appear awkward with your otherwise well-rehearsed talk.

Don't forget your power cord or video adapter for your computer (especially if you use an Apple notebook). I have attended at multiple talks that were delayed for fifteen minutes while hosts frantically tried to find a video adapter for the speaker. You don't get those 15 minutes back.

Bring a 10' power cord. You don't need a heavy industrial cord, just something that will accept your computer power cord. I have given talks in more than a few places where the nearest outlet was beyond the reach of my computer power cord. Not all places will have an extension cord available. While this may sound like overkill, it can be the difference between your computer running out of power and a flawless talk.

Turn off your screen saver and energy saver on your computer. It is distracting when the computer screen goes blank or shows a series of pictures of your trip to the Galapagos, especially if you're answering a long question.

Familiarize yourself with the operation of video projectors. Many departments do not always have an expert available and you may need to set up the projector and connect your computer yourself. In addition, many well-meaning hosts do not know how to

improve image quality on a projector. If you have movies or dark images, knowing how to properly adjust brightness or contrast is the difference between showing people your research and saying "Um… It looks fine on my computer, but not here on the screen, so you'll have to trust me" during your job talk.

The Chalk Talk

Not all interviews include a chalk talk. For example, I gave four chalk talks for eight interviews. Each followed a different format, but they all shared one thing in common: they felt a lot like retaking my graduate qualifying exam.

A chalk talk typically will consist of you outlining the first 6-10 years of your research program (about the time it takes to get to tenure, in departments that have tenure) in front of the department faculty and often faculty from other departments. You may be permitted to present a short PowerPoint slide presentation (one of my own chalk talks) or you may be expected to only use chalk (or white board markers) (my other three chalk talks).

Preparing for a chalk talk is at least as important as your Job Talk (and often much more important).

A quick note on European faculty interviews. Do find out the interview format in advance. Often, but not always, there may be a single talk fusing a job talk and a chalk talk into a single twenty (20!!!!!) minute talk. There may be a group interview (you see and hear your competition). You may be expected to ask questions of your competitors. In another version, you find institutions that agree to give you a faculty position if you secure a grant. There is an equivalent version in the US, when postdocs transition to "instructor" or other non-tenure track investigator titles. These positions might provide some space, but no funds, There are certain fellowships that require the Dean of the institution to provide a letter promising to make the instructor into a tenure track assistant professor if the fellowship is awarded.

The Chalk Talk, simple in principle. The first question I usually get about chalk talks is, what is a chalk talk? It is a 30-60 minute session with department members to discuss your research plans for the next 6-10 years. The format is typically you, department faculty, maybe other faculty, dry erase markers, and a white board. You will describe how you will break open your research field with significant progress on the problem you have chosen, how you will overcome technical obstacles, your alternative approaches, potential for collaborations, critiques of your postdoctoral research, etc. You'll introduce the problem, what you see as significant about solving this problem, your central hypothesis, and the goals for testing the hypothesis and solving your problem. Think of it as an updated version of your graduate qualifier. You must be able to explain why your proposal is significant, why you, why your approach is the best approach, and what your alternative backup strategies/approaches will be.

Sometimes you'll have the option to use slides. I'd steer away from this option if you can. Slides can smother an exciting idea in unnecessary distracting detail. It's tempting to lean on slides as a crutch for a thin proposal. Chalk or markers force clarity and brevity in a way slides don't.

You DO NOT need to present a detailed review of your field or the finer points of your techniques. You DO need to know the literature of your field and all of the caveats

of a technique and alternatives for an approach, if asked. The key to a chalk talk is to engage your audience. Get them excited about your problem. Then convince them that you have a solution. It's that initial part about engaging the audience that is so vital because it's difficult to get attention back once an audience member loses interest and starts looking at their email.

Key considerations when developing your Chalk Talk.
These items should be part of your chalk talk introduction/overview. These items should be plainly stated. I would not recommend putting these into slide format. You want people to focus on you and your ideas. Slides will be distracting.

1. **What is the big question?** Your big question should be something that anyone could relate to, that people would agree is important to understand. A big question should be a high level version of your problem. You'll get more specific further into your intro, but the initial engagement needs to be understandable by anyone, at best, or someone that has a college undergraduate education at a minimum (1-2 sentences). For example:

Distinguishing correctly folded and misfolded proteins is essential for human health. Failure to do so is implicated in several human diseases.

Proper patterning of cells and tissues is fundamental to development. I'm interested in how cells find their way to the correct positions in tissues.

How does the brain distinguish different human faces?

How does sleep improve memory formation?

What role does our own immune system play in causing tumor cells to metastasize?

2. Why is this a significant problem? Significance could be related to a disease, but it could also be fundamental research. For example, determining how a process is regulated may not be immediately connected to a disease, but the basic biology could open entirely new lines of inquiry, could turn out to be important for diseases in unexpected ways or could even represent a solution to a long-standing problem. For a specific example, knowing how a neuron circuit in fruit flies regulates a simple fly behavior sounds like a very specialized problem. Yet, this is a big opportunity in neuroscience to determine the mechanism of behavior because we have a map of all of the fly neurons, as well as several genetic lines for which individual neurons can be turned on and off. Defining this mechanism would achieve a long-standing goal in neuroscience, describe a solution for this general problem of neurons and behaviors, and lay the groundwork for studying the problem in more complex organisms.

3. **What is the knowledge gap in the field?** What specific problem are you going to solve and what have been/are the barriers to solving it? **(2-3 sentences)** For example, if one was talking about the immune cell example, you might say: We know that communication between immune and tumor cells is a key step for tumor cells to release from the main tumor and colonize other parts of the body. Macrophages produce an interleukin, IL4, which regulates tumor metastasis. Due to a need for high resolution microscopy and new tools for distinguishing between different modes of IL4 delivery, it has not been possible to determine how IL4 is delivered and thus how delivery (and metastasis) might be prevented.

4. **What are your goals?** How will your approach resolve this problem? You could fully describe your official goals, but I suggest distilling them into simple goals/outcomes with a note on methods. This isn't the time to go into detail. If you can get this information out to your audience in first few minutes, in a way the rest of the chalk is less critical. The audience will know the general plan. That's much better than running out of time before getting a chance to talk about goals 2 or 3.

5. **State how successfully completing the research will advance the field, create a new field, impact disease treatment, have broader impacts etc., again in clear terms.** For example, Working out the mechanism and a model of how flies avoid colliding with walls will establish the workings of a complete neural circuit, reveal how flies perform a complex task, and potentially use biology to inform how self-driven cars could better navigate around objects.

Note that the previous list is all fairly concrete. Listeners could agree when a task has been successfully completed. In contrast, vague outcomes are problematic. For example, a list of genes to be determined or writing *"Implications for human disease"* is practically meaningless. Instead, consider *"Defining the components and steps in this pathway will enable us to identify potential targets for therapeutic interventions."* A problem has been solved. You do need to be able to deliver on a solution that everyone will agree is a meaningful concrete outcome, not just a list of stuff.

6. **It will be a bonus if you can state which NIH or NSF institute/study section you will be submitting your first grant proposals to and if you can say that you have spoken to the program officer (state the person's name) about your proposal(s).**

Keep in mind these 6 points only cover the first 5-10 minutes of the chalk talk, but this is the make or break part. You rarely make it through all the details of your aims later on in the chalk talk. You'll be interrupted with questions constantly. It's much easier to field those questions when you know you've already given everyone a simple, plain-language map of where you're going. Expect to spend up to 10 minutes on the overview, another 20 minutes presenting two of your aims, and plan to spend roughly 30 more minutes fielding questions throughout. For the rest of the chalk talk, as with your job talk, resist

the temptation to overexplain: reverse-engineer it by identifying the key points for each aim, give those priority, and save the finer details for whoever asks.

You will be asked questions about anything related to your research. The audience may be generally friendly or may be very aggressive. The aggressive people may be doing this to try and provoke you to see how you perform under stress. In two of the chalk talks I gave, at least one questioner was openly hostile and asked pointed and even insulting questions. Defending yourself under these circumstances can be a disconcerting prospect. It is difficult to divine a questioner's intention, so assume that all questions are serious and deserve a gracious, intelligent, and serious response- no matter how outrageous the question may be. If the questioner is genuinely hostile and behaving inappropriately, other faculty may chastise the questioner for being unreasonable. Be gracious and give the hostile questioner credit for asking important or insightful questions, regardless. This person may be your future colleague and it is possible that you may win him or her over by not being dismissive of the questions.

It is important to remain calm, admit when you don't know something, admit when you were incorrect, and defend what you know is correct. You will be evaluated on how you develop and defend your ideas, as well as the overall feasibility and fundability of your proposal.

Typical questions include:

1) How will you compete with others in your field? What makes your research proposal unique? (NOTE: You should know who your competitors are by name and how your research differs from their work or what edge you have to make study sections want to fund your research). How will you avoid competing (or distinguish yourself from) with your advisor?

2) What if your approach doesn’t work? What then?

3) Are there any downsides or limitations to your approach/tool?

4) What is your dream experiment and the anticipate result? Or What is the first experiment/aim/thing you will do in your new lab? Why?

5) What do you need from our institution to successfully execute your proposal? This is an important question. You are explaining WHY you think this institution would be a good fit for your program’s development. If your research could really be done anywhere, that’s nice, but it would still be better for you to have an answer that makes the case that it is in your interest to be at this specific institution.

6) Is there any potential for collaborations within this department or institution? Be careful not to commit yourself or anyone else to collaborations unless you have already discussed this before your chalk talk. No one likes to be roped into something that they did not agree to. Also, you have a research program that you need to get off the ground. You need to focus. Collaborations can be great or they can be miserable. I strongly recommend three things. First, if your research will require a collaborator, have someone

lined up, not to be determined. Second, do not promise to collaborate with any specific future colleagues. You usually don't know them. I suggest saying that you see potential synergies with some labs in the department/institution. Third, do not assume you will magically find a collaborator for a key goal of your proposal. Everybody is busy and not everybody is a good choice for a collaborator. Strategize before the interview to ensure your research program will be feasible in part because you have key personnel already lined up.

7) We have undergraduates that are seeking research experiences. Do you have projects that would be suitable for them? How can they participate in your research program?

8) What will you do if everything you propose is completed by another lab by the time you start your new lab? Don't panic! This is not to see what you will do if you can't do what you proposed. Rather this is a chance to see if you have a longer term view of your project, as in "That would be great! Upon verifying the other lab's results, I could now start working on the next stage of my program and …"

9) You said you want to use GFP for your studies. Which GFP and why? Note that I ask this question because many fluorescent proteins have serious caveats for certain applications, especially protein fusions. If the candidate is unaware of these issues, this is not a deal breaker, but I am disappointed that the candidate's project might be derailed by a lack of knowledge of their own tools. Also, a candidate could counteract my perception by doing control experiments to show a fusion is functional or could even replace the untagged endogenous gene.

10) What NIH institutes will you apply to and who is likely to be your program officer? Are there any NIH Program Announcements or RFAs that are relevant to your research? Again, the chalk talk is about your research vision for 6-10 years. It can and often does include a discussion of your planned first big grant, so you should be prepared to discuss these items. Answering this question will set you apart from some of the other candidates. Being able to answer this question suggests that you will be ready to go from Day One as an assistant professor. You have done your homework and know what is expected of you. Even if no one asks, you should probably mention at the beginning of your chalk talk that you have spoken with a program officer and have identified an appropriate Institute and Study Section for your first proposal.

Navigating the grant system at NIH is a topic for a separate book. It is never too early start thinking about your first grant and to familiarize yourself with how the grant system works. Some helpful references include:

Fricker, Lloyd D. *How to Write a Really Bad Grant Application (and Other Helpful Advice for Scientists.)* Bloomington, IN: Authorhouse, 2004.

Gerin, William and Kapelewski Kinkade, Christine. *Writing the NIH Grant Proposal: A Step-by-Step Guide*. Thousand Oaks, CA: Sage Publications, 2018.

Robertson, John D., Russell, Stephen W., and Morrison, David C. *Grant Application Writers Workbook. National Institutes of Health Version*, January 2026 Edition. Buellton, CA: Grant Central Publisher.
(This is THE definitive grant writing handbook and is often updated 1-2 times a year. The only downside is that it is $90. Also, you must order it from the publisher. It is not available through Amazon.)

Some not so typical questions that I personally encountered:

- What will you do when it is discovered that your results are artifactual and your paper is incorrect? (A true test of one's temperament is not to be rude in one's response to such a question).

- Our institution offers access to equipment and our expertise. What will you bring to our department/institution?

- I don't get it. Why are you doing this?

Chapter 7. The Interview

If you send out a large number of well-targeted applications, you have a decent chance of getting at least one invitation for a Zoom screening interview. Congratulations! You're probably in the top 5-15 candidates under consideration. If you pass the screening interview and get invited for an in-person visit, you've made the main cut. You're now typically one of just 3-6 finalists, much better odds than the 400 other applicants you started against. You made the cut because the committee is genuinely excited about your application. The committee believes you have the right expertise, strong recommendations, and real promise as both a researcher and a future colleague. From here, keep a constantly updated scheduling calendar to help keep your interview dates straight.

The invitation to the interview and the simultaneous phone interview
Often the search committee will call to let you know you've been selected for an interview. That call serves two purposes: scheduling and starting the interview process, itself. Yes, you ARE being evaluated from the very first call. If it's just the department's administrative staff, you're unlikely to be quizzed on your science, but be polite and respectful, regardless. Everyone is quietly evaluating those qualities and may comment on how they viewed their interactions with you. In contrast, any call from a faculty member is definitely part of your interview for the position.

What should you expect from a phone interview?
The search committee member will:

1. **Gauge your interest.** You MUST be interested, even if the institution isn't one of your top choices. This may be the only interview or offer you get. Importantly, your assumptions about your "dream" versus "backup" jobs could both be completely wrong. In my own case, I was very excited for one position. Yet, the position would have been a disaster if I had taken it. I know this because of information I got from some people I met a year later. I was frankly not initially excited (at least based on the location and the web site) about the job that I ended up taking. In hindsight, the institution and department were definitely the best places I could have ended up. Finally, it may be very useful to have a second offer to help with negotiations (see Chapter 7 on negotiations).

2. **Answer any questions you might have.** You SHOULD have questions. Useful questions to ask include:
   How should I arrange transportation? You have to get to the interview and it is very useful to know which airport or train station to go to, how you will get to the school, whether the school will make your travel arrangements or you will (often you will make arrangements and get reimbursed.
   Is there a particular aspect of my research that interested the search committee and that the committee would like me to focus on in my seminar? See **Chapter 5** on your job talk.

Ask whether you will get to meet with grad (and undergrad, if relevant) students and what the students are like. If this is not on your schedule, I encourage you to press your hosts to get some students on the schedule. These are what your future lab members could be like and it's helpful to know if they think the department and institution are supportive of their education.
How many days will the interview be?
Will I give a chalk talk at this interview? What are the chalk talk guidelines?

3. **Assess where you are in your job search.** You may already be interviewing elsewhere and you might even have an offer. It is helpful that the search committee member know about other interviews and especially any offers that you have. First, offers make you much more desirable. Other schools have concluded you are a strong candidate. Second, the search committee now knows that it will have to compete for you. Third, the search committee will want to schedule you sooner rather than later for an interview.

4. **Schedule an interview.** Have your calendar handy so that you can schedule the interview.

The Online or Zoom interview
Most phone interviews have been replaced with live video interviews over Zoom, Teams, or similar platforms. Video interviews require extra preparation well in advance.

1. Well before the interview, make sure you have a reliable internet connection. It's not uncommon for interviewers to have connection glitches on their end, just don't be the person with the problem. Make sure everything works with whatever software the interviewer will be using (i.e. Zoom, Skype, WebX, etc.). You should NOT rely on a wireless connection. Even though it is increasing rare to have an ethernet connection, you should use one.

2, The interviewers can see you. Consider the lighting and background, as well as the desk/table and any visible clutter that may show up in your web camera view. Treat the surroundings like you would treat your personal appearance for an interview.

Dress as you would for an in-person interview, even down to real pants (not sweat pants) and shoes, if only to remind yourself this is a "real" interview. Mind your posture and position your camera so your eyes sit about a third of the way down the frame. It will feel like you're speaking directly to your viewers, even though you can't guarantee that's how they're framed on their end. Most laptop cameras are fine, though you can upgrade to an external high definition webcam, if you like. Avoid a bright light source behind you (it puts you in silhouette) or directly above or beside you (it casts shadows). You want your medium to medium-bright light source above and behind the camera, shining on you, not into the camera lens.

You can't have messy notes scattered everywhere. You may want to have some notes or reminders, but you don't want to look like you're not paying attention. Consider posting them directly on your monitor so that your eyes never lose contact with the interviewer(s). Do not respond to emails or texts during interviews. **DO NOT** use AI

during interviews. Those of us on admissions committees notice it when we interview grad school candidates. It's obvious and will remove you from any further consideration as a candidate.

Do a mock interview with a friend over Zoom and have them critique what they see: Can you be seen clearly? Is the light casting shadows? Can you be heard clearly? Is your laptop positioned so your posture looks good on screen? Is anything distracting visible behind you? Also check for ambient noise your microphone might pick up. Is your microphone clear.

It is worth noting that you may not be able to see the interviewers. This may be a little disconcerting and you would do well to practice for that possibility. You may also be able to ask interviewers to turn the camera on themselves when each one is asking a question (if the camera only shows one person at a time). This can help you establish a rapport.

3. Remember this is a real two-way interview. As with a phone or in person interview, have questions for your interviewers. Do your homework and be ready to discuss the work of the interviewers and what you want to know about the position. Have questions about the department and any resources you need (i.e. Is there onsite access to specific equipment or service X?).

4. Be ready for chalk talk type questions. What will your first grant focus on? Do you know what study section you'll submit the grant to? Do you have an alternative approach? What knowledge gap will you resolve?

5. You may be asked to present a short PowerPoint on your teaching or related to your research proposal. You should have a 5-10 min version of your research proposal pitch ready to go before you get any interview requests.

Determine: How will this look without you standing next to a screen? Can you effectively communicate your message when a slide is on the screen, but you are not visible (e.g., you can't move your hands to demonstrate something). Is the material easy to follow or very abstract? Is there a modest amount of material or a lab meeting style data dump (hopefully the former, not the latter)? Be sure to share your PowerPoint/PDF/Keynote file with another computer (try Mac and PC) and see if that displays correctly.

Think about: What are the key take home messages you want to convey and how much detail you really need to go into. The number of slides should be minimal to enable you to get through most if not all slides.

6. You may be asked to teach/lecture during the interview. If so, create a very short lesson and have it ready. What key idea would you like to convey? What story, analogy, data, images, text will be needed to tell this story?

You may be asked some very bare bones questions: "In your classroom, what are you teaching? How? How do/will students respond/interact with you and each other?" Be prepared with thought out (not rehearsed sounding) answers.

Preparing for the in person interview

You already have your job talk and chalk talk prepared (see Chapter 5). DO NOT WAIT UNTIL WHEN YOU GET AN INTERVIEW OFFER! You may need to tailor your talks based on the job advertisement on your discussions during the phone interview (see above). However, you still have many important preparations to make.

1. Research your interviewers. You'll get (and should request) a list of everyone you'll be meeting. It is essential to know what each of them studies (or teaches). Reading your interviewers' web pages, and even a paper or two, can make a huge difference. One or two intelligent questions about an interviewer's research signals genuine interest far more convincingly than just saying you're interested.

As an interviewer, I rarely encounter candidates that know what I do. I'm personally not looking to be flattered. I want to know that the candidate has some idea of what people in the department do and whether the research in the department will be interesting to the candidate. In other words, does the candidate care about this particular job or is this just another job interview. Does the candidate want to be MY colleague?

You won't be expected to know the details of each interviewer's research, or quizzed on their papers, but you should know their general topic, ideally their model system, and their major accomplishments. It's embarrassing to meet a Nobel laureate or a Lasker, Fields, or MacArthur winner without realizing it. Big bonus points if you can relate your research to your interviewer's interests and ask questions about their papers. Genuine knowledge and appreciation of your interviewer's field helps, too. That said, this is not something you can fake. Reading a review or paper of theirs beforehand is great. However, don't pepper the conversation with borrowed jargon, which reads as strange and tends to lower your interviewer's impression of you rather than raise it.

To maximize your preparations and to keep your different interviewers straight (very helpful when you have 8-20 interviewers in a visit, seriously), print copies of the salient parts of their web pages, abstracts of any important papers, and reprints of papers or reviews to help you better understand any topics completely outside of your expertise and training. You will want to bring this information with you on your interview trip to study the night before the interview. I did.

2. Request to meet with specific people. As soon as possible, scan through other department websites for the institution. Identify any other individuals that you wish to meet. This can include people in computer science, physics, chemistry or other disciplines of biomedical sciences. This request accomplishes two goals. First, you are demonstrating your interest in the institution and that you are taking this interview seriously. Second, you can meet people that may be future collaborators. For example, if you think you may need to do protein structure at some point in your research, then meet the resident crystallographer or cryo-EM expert and determine if you might want to collaborate with him/her/them.

3. Request to see relevant shared resource facilities. Some core facilities have a director. If you need to know what equipment is available (and how available), fees for use, services, etc., then you will want to ensure the core facility director is on your schedule.

4. Request to meet with graduate students. Many schools will schedule a lunch for you and the students. This is an excellent opportunity to get a sense of the students that might join your lab.

3. **Coordinate any special requests with your contact person as soon as possible.** Do you need audio playback for your talk? Do you have special dietary considerations? Mobility restrictions?

4. **Make sure you know how to get from the train station or airport to your hotel. Make sure you know how to get to your interview.** Many places do provide a host, but some places might just give you an address.

5. **Additional Thoughts.**

- The interview process is a two-way street. You're being considered for a job, but you're also considering whether to take one. This begins during your first in-person visit and should matter even if that one position turns out to be your only offer. I'm going to say something you might consider heretical, but it is sensible, the more you think about it.

You're better off not taking a bad job. Seriously. You worked hard to get here not just to get any job, but a job you'll like and hopefully love. You need to do your own detective work. Ask questions about how faculty are supported, how new hires are mentored, teaching expectations, and whether people actually collaborate. Don't worry about questions about health insurance, parking, or 401(k) details. Those details are generally non-negotiable, will be spelled out in your letter of offer, and don't vary dramatically between institutions.

- Course ideas. As a future professor, I was interested in creating courses on quantitative microscopy, organelle biology, and a tutorial on landmark papers in cell biology. During meetings with department chairs, administrators, and some faculty and students, I asked about opportunities to create new courses and suggested my course ideas. I found people very receptive to these ideas. Institutions want to have up to date courses and want to offer students new kinds of courses. Discussing this topic during your interview is one way to demonstrate your interest in education and one aspect of value that you can bring to the institution. If you plan to discuss ideas for courses, you should be prepared to briefly outline the course goals and content. That said, you also need to seriously focus on getting your lab up and running. Courses are very time consuming. Teaching can be rewarding (and I **LOVE** teaching). Still, you should be modest about your vision for course development in your first years as a new professor.

- Other research passions. At your interview, you will outline your future grant proposal for your immediate research plans. However, there will be opportunities over meals and during some interviews, when you may wish to describe other research interests. For example, my research focused on endoplasmic reticulum structure and function. I was also thinking about a wild idea to study the "ecology" of organelles. Some interviewers were intrigued and other people thought it was a little bizarre. The reason for bringing up such ideas is that you are letting your interviewers know that you are not a one-trick pony

and that you are genuinely passionate about science. There is a fine balance to strike in that you want to ensure everyone knows your main research program IS your focus. Your other ideas should be more casual discussions and something that you appreciate would be longer term goals.

The Actual Interview
Prepare for a very long day or two days. You will meet with 8-20 people/day.

1. You are in the spotlight from the moment you arrive until you are dropped off at the airport (or train station). Everything you say will be taken into account. People will probably be nice to you, but nobody is necessarily your friend. If you tell someone something in confidence or complain about your visit, it *will* get back to the search committee.

Be natural. It is obvious if you are being stiff or insincere and this will make for a poor interview. People are deciding whether they would like to have you as a future colleague.

2. Do speak up if you need to use the restroom. It isn't on your schedule and people often forget to ask you if you need to use the restroom. Do not suffer in silence.

3. Meetings with Faculty. These meetings are the people you meet will be your future colleagues. You want to be courteous, show them respect, express enthusiasm for their research and thoughts, and treat them as you hope to be treated as a colleague. The people you meet will be evaluating you for your intelligence, ability to fit into the culture, and enthusiasm for the department. What should you discuss?

-Focus on science and the institution.
- Ask new faculty about their experiences with their department chairs, the secretaries, Dean, grants office, etc. People are usually honest and will tell you what problems they have encountered or support they have received.
- Bring your laptop and printouts relevant to your research. The person you are meeting may not be able to attend your talk. They may want to discuss your research in more detail. Bring extra copies of your papers and your CV.
- If the school does not have a piece of equipment that you need, find out if any of the faculty members would have use for this equipment. This will help later in your meeting with the Chair and/or Dean if you need to negotiate an expensive piece of equipment.
- Identify and *maybe* suggest potential collaborations. These people will be your future colleagues and they might be more excited about hiring you if they can see personal benefits to having you as a colleague. As I noted in the discussion about chalk talks, you want to be very careful about committing to collaborations. You do not know these people and they could be reasonable colleagues and horrific collaborators (I met more than a few as a professor). It's OK to have shared interests and consider potential synergies.

Inappropriate Personal Questions

All kinds of questions come up during interviews or over dinner and some of them are inappropriate. The search committee is not legally allowed to ask about your marital status, age, religion, or whether you have or plan to have children. These questions are violations of employment law. The people asking are often completely unaware of that, and may be asking for entirely innocent reasons, just to make conversation or get to know you. Still, be aware that questions like these have historically been used to quietly rule out candidates: too old, the wrong religion, likely to take time off for a family, and so on.

You can answer the questions if you want, but are not obligated. I was asked these questions regularly at dinner. The answers were unimportant to me and unlikely to raise any warning flags for the search committee. However, if you have a spouse that needs a job or you are pregnant or planning to have children in the near future, you may feel uncomfortable answering the questions.

The simplest approach is to gently turn the question back at the interviewer. If asked about whether you have children, you could respond, "It sounds like family is important to you, tell me about yours." If an interviewer persists, you can still avoid making the situation too uncomfortable and ask "I'm perplexed by your question because I'm unclear on why my marital/family status/age/nationality (for example) is critical to performing this job. Could you shed some light on why you are asking this question?" Hopefully the interviewer will get the hint and recognize the error. If not, you can state that you prefer not to answer the question.

Alternatively, the interviewer may be awkwardly trying to help you and wants to tell you about the institution's policies to delay the tenure clock for childbirth or to let you know that the institution is open to helping find a job for a spouse. In general, assume the best of intentions, try to gently redirect any awkward questions towards more appropriate questions.

If you have Absolutely NOTHING to Talk About

On rare occasions, there's genuinely nothing scientific to discuss with an interviewer. For example, your fields are different enough that they don't see the point in trying. That's unfortunate, but you still have 30-60 minutes to fill, and it can still be a productive conversation. Try asking about:

- what the students are like in courses, during presentations, in the lab
- living in the area- where, are there good schools for your children
- equipment and facilities
- institutional support (pilot awards and money during funding emergencies)
- teaching load

Meeting with Students

At most institutions, you will meet with graduate students and sometimes with undergraduates, often over lunch. Hopefully, you requested this meeting (see earlier). You may remember such lunches from when you were in graduate school. You may also remember how boring some of these lunches could be if the speaker asked everyone to go around the room and describe what each person was studying. This is an acceptable tactic if the students aren't talkative. However, there are better and more memorable ways to engage the students.

Many of them hope to be where you are in another 3-5 years. They will want to know what it is like to be a postdoc, what is necessary to succeed, and what the job market is like. Students may also want to know what plans you have for them. That's right. The students may expect that you will take an active interest in their professional development. And, frankly, they should expect it. Graduate education means "education," not simply having someone do experiments in your lab or someone else's lab. You should think about this before your visit and be prepared for these types of questions.

I had been on graduate council as a student and had been active in organizing and promoting graduate student activities in graduate school. I already had some ideas. At my interview lunches, I asked the students about what kind of graduate organization existed at school and what kinds of activities there were to get students out of the lab every now and then- ski trips, happy hours, etc. I also asked about how often students got to practice giving seminars to their school or department. Did this include feedback? At many schools, students only present their research to lab members in lab meeting and during their thesis defense. I consider this unacceptable and told students that I would work to promote a student seminar series. Other ideas to be discussed include student invited speakers, how is the qualifying exam structured, where students go to do postdocs, career seminar series, grant writing workshops, and quality of course instruction. Most students will have opinions about these topics and will be happy to share them with you. Not only will students get an idea of how much you value their professional development, but you will also get some ideas about the qualities, needs, and ambitions of the students. You will also learn how much regard the department and school has for the students.

Meeting with the Dean

This meeting is often jarring in relation to all of your other meetings. You typically will not be discussing the finer points of your research interests. Rather, you may learn about the institution, how being a faculty member "works", expectations for your performance and success, institution plans for growth, etc. The useful things you can talk to the Dean about include: 1) core facilities and development of new cores as needed, 2) Dean's vision for molecular biosciences (or your broad area) for the next 10 years at the university including plans for recruitment of additional faculty, 3) The university's support mechanisms for new faculty, and 4) tenure and how to get it.

In addition, this may be a practical discussion with someone that is trying to assess if the institution can afford you. This is not something you should overthink, but it does matter. What do you REALLY need to do your proposed research? Do you need a whole floor of a building? Do you need $2 million worth of equipment just to start your lab? Do you need one or more expensive instruments solely for your lab's use? Maybe you do. Maybe you think you need all of this, but your usage will be more modest (20 hours/week) or you can do the first few years of your proposal without that very expensive instrument. Your plans to need to be a balance of reality and practicality. Also, remember that if you have a very expensive instrument all to yourself, your lab is probably going to be responsible for the usually not inexpensive service contract ($10-30k, annually). That could be 10% of a grant.

I did my postdoc in a lab that was fortunate to have three dedicated confocal microscopes. ($500k+ each). I assumed that I needed a confocal microscope just for my future lab's use. Other colleagues negotiated a confocal as part of their startup packages. I

even had two institutions offer to buy me one. In the end, I went to the institution that did not buy me a confocal. I got funds to upgrade the instrument in the core facility, buy a widefield fluorescence microscope for my lab's personal use, and funds to put towards a new confocal if I could get grant funding for one. I was able to use the instrument in the core facility, especially after the upgrades. I ultimately got access to a microscope with new capabilities a few years after I started by writing a special grant, a Shared Instrumentation Grant. Part of the purchase involved the grant and my startup funds dedicated to a new instrument. By that time, my lab was larger, we needed more time on a microscope and needed some new features. Even then, we housed the new instrument in the core facility, which provided maintenance and covered the service contract. Obviously, each situation is different. I cannot tell you what you do or do not need for your startup package. My point is to be open to shared instruments, getting an instrument that is sufficient for now, but has upgrade potential or even realizing that something might be nice to have, but is not required for your research program. I now know that I was an expensive hire. One institution made me an offer, knowing that they could not provide the minimum needed microscope access for my program. The department was very nice to me, but in the end, I could not do any of my proposed research without access to a confocal microscope. You need to decide what kind of research program is reasonable for you. If you can explain what your lab ideally needs, what would be sufficient for your lab/what you would be open to (e.g., a shared instrument), and what's going to be a deal breaker, then you are not being greedy. You are articulating what is needed to conduct your research program.

The Dean may or may not still be doing research. If possible, read up on the Dean's research and be able to chat about it.

You should also find out the expertise of any administrators you will meet. Many of them were once faculty and some even still conduct scientific research, especially at medical schools. This latter point is important for your future. That is, it is useful to know whether the Dean understands and appreciates your research. Your Dean can be very important when you are applying for fellowships and shared instrumentation grants. Fellowships often require a letter of support from your Dean. Shared instrumentation grants often fare better if you can secure an institutional commitment (i.e. $$$) to guarantee space and either help purchase the equipment or pay for the service contract. Thus, even if you don't meet with the Dean on a regular basis, the Dean plays an important role in your career development and supporting your research infrastructure needs. This interview is more than a formality. You need to make a good impression and begin cultivating a relationship that will help your career.

What will you discuss with the Dean?

- Promotion and tenure. The Dean is very knowledgeable about statistics for promotion and what are the typical expectations for promotion. The expectations are always: papers, grants, teaching, and service, with extra emphasis on the first two.

- Your expertise and what you will bring to the institution

- The expectation that you will bring in grants

Preparing for the meeting with the Department Chair

All of your interview meetings are important, but the chair is the one who has a substantial say in hiring you. The chair is also supposed to be your advocate when seeking funds and space from the Dean to hire you. You NEED the chair to persuasively advocate for you and your research program requirements. The meeting begins the negotiation process. You need to be prepared to tell the chair what you will need to start your new lab. You must do several items of research before you go to this meeting.

1. Try to find out how much other faculty make at the institution, especially new faculty. This will give you a realistic idea of how much salary to request, if asked. This information may either be in the actual job listing or you can ask other faculty at the interviews. Junior faculty are the ones most relevant to ask. Do note whether the individual is PhD or MD/PhD (which tend to get higher salaries). The number that you will be told is part of a range. The number is useful so that you won't say that you expect $100k at a school that will offer $50K or vice versa.

2. Find out how much space junior faculty typically get in new labs at the institution and ask to see the space intended for yours during the interview, if possible. Regardless of the outcome, this shouldn't be a dealbreaker. Space needs vary and availability at many institutions is a constant game of musical chairs (successful labs outgrow their floor, retiring faculty take forever to vacate theirs, and so on). Based on my own experience, as well as conversations with faculty at many institutions, you can be fairly confident your promised lab space will not be ready on your actual start date. There are exceptions and hopefully, you're one of them. As a precaution, plan for downtime (papers to write, equipment to order) and ask the chair for some interim bench space.

This waiting period can also be a good time to test-drive core facilities and see how available they really are, how fast turnaround is, and whether they reproduce the expected results on a control or standard only you know the answer to. I've personally had experiences with two core facilities that were unable to accurately identify a relatively simple standard. I've also worked with a sequencing facility that loaded the incorrect samples. Then there was the facility that was painfully bad at molecular biology. Please don't take these examples as a general condemnation of core facilities in general. I've worked with and depended on several great core facilities over the years. I'm alerting you to the reality that quality control and expertise can vary widely. Your funds are limited and your studies depend on getting the correct information or reagents from core facilities. Do you own testing to validate core facility reliability.

3. Determine how much you will need to start up your lab. This should include equipment, salary for at least one grad student/postdoc/tech for at least one year, and other operational costs such as publications, funds to attend conferences, service contracts, core facility costs, and email accounts. Ask people who have started labs at similar institutions in the past three years what their costs were. Note that numbers for salary will vary between institutions. What you want to know is whether you'll have enough in the salary bin to cover 2 grad students? Postdocs? Techs? for x years.

4. What are the teaching expectations? At a research institution, you should try to get protected from teaching and committees for at least one term and preferably one year. If you are asked to give one or two lectures in a team taught course, that should be OK and can even be a great thing, esp. if you're teaching in fall term. When you teach, you are advertising what kind of scientist and mentor that you are. If you explain things well, engage students, and can highlight your exciting research, you may well attract a rotating student or interested undergrads. On the other hand, teaching an entire course is a huge time commitment (e.g., plan on 10 hours prep for each new lecture that you deliver).

5. Do you need any special (expensive) pieces of equipment? How much does it cost? You should get a quote for the equipment before going to this meeting and bring the quote with you. The Chair will know you are serious and will be able to tell you whether this is realistic. Maybe it's difficult to justify one big expense for a single department member. An option to think about in advance is what if the school will get the equipment with you being the primary user, but sharing the equipment with the rest of the department or even institution. This can be a good solution if few people are likely to use the equipment or you could get stuck with operating a core facility. Be careful. Some institutions will say they can't afford the equipment and might help you with partial funding if you bring in a shared instrumentation grant or some such thing. You need to evaluate whether you can do your research under such conditions or if the equipment you need exists in another department and if you could access it. Don't shortchange yourself. If you need the equipment and the school can't provide it, your research will suffer! And the tenure committee will still evaluate your portfolio for publications and grants regardless of any notes saying you couldn't get a key piece of equipment.

The meeting with the Chair:

1. Don't start by asking for anything. Let the chair ask you what you need. Start all discussions as questions, not demands. For example, compare the two approaches: 1) I must have a Zeiss confocal microscope, in my new lab, for my lab's exclusive use. 2) Is there a confocal microscope available in the department? If not, is there one available on campus? If so, how much will it cost for me to use? If not, would the school be able to provide a confocal for the department with my lab as the primary user? Be prepared to explain exactly why this item is essential for your research. If the chair is determined to consider your equipment for the larger department (and you can live with this), identify other department members that would benefit from this equipment. This will make for a much stronger case.
2. Do ask the chair what is expected of you (i.e. teaching, percent salary from grants, etc.), how the tenure system works, and about available resources (such as cores), when would you be expected to start?
3. If the chair asks, do say whether you have scheduled interviews at other institutions. This is very important. Some institutes will try and make you an offer very quickly. You need to give yourself time to explore your options. In addition, other institutions may make you offers and these can be used to negotiate a better package.
4. Ask if the university have any pilot awards, student support or other kinds of awards? These can help stretch your startup package.

Seminar
Your seminar must be perfect. You have practiced this talk in front of others. You have a backup on a flash drive and the Cloud. If your file is small enough, you can email it to yourself. Your talk needs to be in some usable format! The Seminar is discussed extensively in the previous chapter.

Chalk Talk
The Chalk Talk is discussed in the previous chapter. Note that there may not be a Chalk Talk. There may be a Chalk Talk only if you are invited to a second interview. The Chalk Talk may be an extended discussion after your seminar. Ask your host before you travel if you do not see Chalk Talk on your agenda.

Dinner
Now is the time that your hosts hope that you will feel relaxed. They will often encourage you to drink alcohol and the evening can last up to three or four hours. This is after your very long day of interviews. This is not the time to relax. **You are still being interviewed.** Continue to say nice things about people, don't get drunk, and have several questions to ask. This is your chance to find out more about the institution: where do people live? How much do houses/condos/apartments cost? Schools for kids? Parking/public transportation? Activities in the area? Ease of recruiting grad students and postdocs? How to manage teaching loads? How good is the grant support office (helpful? chaotic? note this is important because your grants will depend on the people in the office doing things correctly and in a timely fashion), what kind of experiences did your hosts have starting up their labs and what advice would they offer? Does the department/school have a good seminar series? Has there been much turnover of faculty in the past few years? How does the department mentor junior faculty?

Weird things get said at dinner. You may think nothing of something you say and have it come back to you in a very bad way. For example, I met with some faculty for dinner the night before my actual interview. We discussed the equipment in the department, including a new confocal microscope. One professor asked me if I wanted one for my own lab. Of course, I wouldn't object, but knew that this was a half million dollar piece of equipment. I said as much and indicated that if the current microscope wasn't oversubscribed that I could work with it. The professor was persistent and claimed the department chair would be enthusiastic about supporting the purchase of another microscope for my personal lab. I said I'd ask about it. The next day, immediately after introducing himself, the Chairperson said "I'm NOT buying you your own microscope." I relate this story not to make the reader paranoid, but to emphasize that EVERYTHING you say or do will be remembered and relayed to everyone on the search committee.

Another odd dinner happened when I was on the search committee. The candidate had given an excellent talk and a very strong CV. The department chair described some directions for the candidate's research, when the candidate blurted out, "That's great....If I don't get this job, would you hire me as a postdoc in your lab." I think everyone at the table, except the candidate, was stunned. There was no further consideration of the candidate after that statement.

Speaking ill of your current postdoc lab is a bad idea. At one dinner, a committee asked a candidate about their relationship with their PI. When pressed, the candidate voiced

resentment over the PI's "failure" to support their career. This frustration was difficult to square with the strong letter that same PI had written. A few drinks later, the candidate began listing off perceived insults and injuries. The candidate was not considered further. Even if your postdoctoral PI isn't your favorite person, remember two things. First, you wouldn't have gotten this interview if they'd written you a bad letter. Second, if the committee hears you speak ill of people, they can easily imagine you saying the same about them once you become colleagues. The scientific community is small, and word travels fast. A general rule in science is to "make no enemies in science." You never know when you'll need a reagent, a reference letter, a grant review or a manuscript review from someone.

After the Interview

After you return home, you have an urgent task to complete. This will sound old fashioned, but be sure to write a thank you to your host, preferably on a card. It is also respectful to email a thank you to anyone that interviewed you. If you are still interested in the school, say so. If you aren't interested, still say you are interested- an offer could be used for negotiations with other schools. You may not get any other offers. If you really really are not interested (and this was true for some the places where I interviewed), then definitely tell the host that you are pursuing another offer and thank them for considering you.

The Second Interview

Many schools schedule a second in person interview. You've already given your seminar and talked to many of the faculty. You'd think the search committee would know by now whether they want you. In fact, the search committee does want you. If you get invited back for a second interview, you are on a shortlist of one or possibly two people. There are often 2-3 goals at the second interview.

The first goal is to seek approval of the entire departmental faculty. You may not have met with everyone during your first interview and this is the time for you to meet other people that may be outside of your area of research, but are in the department you may join. For example, if you are a cell biologist and the other person is a chemist or an ecologist, that person would be unlikely to be on the search committee for your position. In addition to department members, you will probably meet the Dean (if you did not during the first visit) and possibly other administrators. Joining a department is usually something that the entire department votes on.

How might the department members decide on hiring you? They will want to be confident that you are intellectually rigorous, that you are collegial, and that you will help finance the department through the grants you bring in. This the second goal and this takes the form of the Chalk talk, which you either gave during your first interview or might give now.

The final goal of the second interview is to sell YOU on the institution. It is highly likely that if you have made it this far, you will have other offers that you are considering. The search committee may try to show off the institution and the town by having a real estate agent show you the local neighborhoods, and some houses in your price range. Your spouse or significant other may be invited to the second interview. The goal is to help sell your significant other on living in the area. I am aware of at least a few cases in which schools also assisted spouses in finding a job in the area by introducing

them to relevant employers or even scheduling interviews with graduate school admissions officers. (Yes, receiving consideration for admission to law school, medical school or graduate school for your spouse is a potential perk of becoming a faculty member).

By now, you should know the drill for interviewing with faculty. Be as prepared in the first round of interviews. Bring your laptop computer, your printouts, and read up on the research of the people you will be interviewing.

After your meetings, the chair or search committee chair might tell you on the spot that you'll be offered the position, that other candidates are still being considered or that the committee now needs to formally vote. Whatever you're told, nothing is settled, yet. Do not accept a position on the spot. You will naturally be elated to know that you are desirable for at least one department. This does not mean this is the best place for you. It does not mean you will not receive other offers (usually just the opposite). It does not mean the process is over. A position can and should be negotiated. You need to make sure you get what you need to do your research. Express enthusiasm and then wait for the letter of offer.

I have a friend that was too excited to get a job offer at dinner during the interview. The host gave her an envelope that contained a letter of offer. My friend signed it right there, much to the shock of her host. I'm disappointed the host did not stop this or tear the letter up and tell my friend to negotiate. Still, I think it is a teachable moment to remember that this is a job and a business. Ignorance of the process does not mean that you'll get a do over or that people (even well-meaning people) will keep you from making rookie mistakes. Use your scientific training and always ask questions if you do not understand something. Do not be afraid to seek more information before committing to anything. Without trying to be overly dramatic, this IS a big decision.

Chapter 8. The Letter of Offer and Negotiations

If you impressed the search committee, you'll receive a letter of offer, often preceded by a phone call letting you know you've been selected. That call is rarely just a formality. The call is the start of the negotiation period, where the school now has to persuade you to take the job. After everything you've gone through, it can feel strange to have the tables turned like this, especially since almost every job you've held before, you just took as offered. Now you get to define some of your own terms. Most candidates I meet are surprised or confused by the negotiation process. I certainly was.

The call you receive may ask for your requirements on the spot. You can state them directly, promise a written list, or ask what they plan to offer and wait for the letter. I prefer the latter two, since everything ends up in writing. If the caller outlines what the letter will say, just tell them you look forward to receiving it. Do ask about any special equipment your research requires: if you need a $500,000 microscope, or at least reliable access to one, find out what the institution is proposing, building on whatever you already discussed with the department chair during your interview (Chapter 7).

This is also the time to let the search committee member know whether you have additional offers. This will let the committee member know that the institution now has to compete for you. Do not volunteer the terms of your other offers. This is a bargaining chip for you. As in cards, don't tip your hand just yet.

First, decide whether there is any possibility that you would accept an offer from the institution. If not, politely thank the caller and inform them that you have taken another offer. If there is even a remote possibility that you would take this job, then you can move onto negotiations.

Surprisingly, this was the most stressful part of the job search for me. I had multiple offers and wanted to take the job that would make me happiest. I also had very little idea of what I could negotiate.

How much you can negotiate depends heavily on what other offers you have. With no competing offers, you can still ask for what you want, but you're not guaranteed anything beyond the initial terms; with competing offers, institutions have to sweeten the deal to compete for you. This is one more reason to apply to several positions. Having another offer increases your negotiating power. Without leverage, you can still make reasonable requests, but your only real recourse if the school says no is declining the position.

Once you decide to enter negotiations, you'll get a first letter of offer. Don't accept the letter immediately. This isn't about being greedy; it's the last time you'll have this much bargaining power with your new employer (at least until competing schools try to poach you later, which is a topic for another book). Treat this as your opportunity to get what you need to start your lab, and maybe a few perks besides.

Strategies for negotiating

1. Get everything in writing!!!!! Everyone will tell you this and it is excellent advice. When you start the job, the institution is only legally obligated to provide you what is listed in your letter of offer. This is basically the contract for your job. No matter what anyone promises, don't believe it until it is in writing. This is also a good reason to carry

out most negotiations by email. Then everyone has a written document of the negotiations and you can be assured that you have not been misunderstood.

2. Your letter of offer will come with a deadline to respond, usually two weeks to a month, meant to put some pressure on your decision. Consider it from the institution's side: the search committee ranked candidates after the interviews, and you're probably their top choice, though maybe second or third. If you decline, they move to the next name on the list. However, if you take two months to decide, that person may already have taken another job, leaving the committee with no one to hire. The sooner the position is filled, the sooner the committee can stop interviewing and get back to their own research and obligations, which interviewing six or more candidates can force you to put on the back burner.

Now that you know why there is a deadline, you need to decide whether you need to extend it. Do you have any other interviews scheduled? Do you have any other offers to negotiate? If so, request, in writing, to have the deadline extended and for how long. Any reasonable school will give you an extension. A couple of months is possible, but is a long time for the school. Don't be pressured to take the first offer that comes along, but don't keep the school waiting forever either. Remember the school wants to complete the faculty search. It is a courtesy to state why you need the extra time, but it is not essential that you explain why in detail.

3. With a letter in hand, it is time to move towards your endgame. You can contact any other schools that are still considering your application and inform them that you are very interested in their institution and that you have some time constraints because you already have a letter of offer from another institution. Do indicate the name of the institution that has made an offer. Be aware that not all letters of offer are created equal. An Ivy League Institution is unlikely to suddenly decide to interview you because you have a letter of offer from Bob's College of Biology and Appliance Repair. Also, you need to be clear on why you wish to be considered by the other institution(s) when you contact them. I don't recommend that you try to draw out the process and contact all of the remaining institutions, just the ones that you would seriously consider as an alternative.

4. Going forward, you need to compare each iteration of the letter of offer for details. Most people will negotiate in an honest transparent manner. However, someone could give you what you requested and then take away something else. If you notice, you could be told this was an honest mistake. Maybe it was. Do not sign the letter until it is corrected, the change is satisfactorily explained or the final letter is acceptable. Get every correction/change IN WRITING!

What to ask for:

1. Higher salary. You'll likely be offered a moderate salary. Do your homework on typical salaries by institution type and location. A low-sounding number may come with a low cost of living. Also check how much of your salary is guaranteed versus dependent on grants you bring in; many medical schools only cover 10-50% of salary directly, so asking for a higher number often means higher expectations for your grant income. Don't

sell yourself short, but know exactly how much of any requested salary is coming from the institution itself and how much YOU will be on the hook to cover as you become responsibility. Put another way, a bigger salary means a bigger obligation for you, because same percent salary obligation for a bigger base number.

A colleague described how several of his letters of offer did *not* spell out what percent of the salary would be covered by the school. It is unclear how common this practice is, but it is information that you must find out. At the very least, you need to know what is expected of you. Speak directly with your department chair or the head of the search committee until you get a satisfactory answer and, as always, *get it in writing*.

2. Protection from teaching and committees. Setting up your lab, hiring, and training people all take time, and a full course or a demanding committee (graduate admissions, faculty search) can eat into that badly when you most need it for writing grants and generating preliminary data. Ask to be protected for the first year, and negotiate down from there if needed. A compromise of one or two weeks of lectures total or a low-commitment committee that meets infrequently is a reasonable landing spot.

3. Bigger start-up package. Packages will vary significantly between institutions. State schools will typically offer smaller packages than private schools and medical schools will typically offer the largest packages. Realize that if a medical school offers you a $400,000 package, a small state school or liberal arts college will not necessarily be able to match it. Consider what the package includes. For example, two years of salary for a technician/postdoc/graduate student is extremely valuable. Lots of lab space is nice, but you need people and equipment to populate the space and make use of it.

I received several different startup package offers:

Salary ($60-86k)(in 2004), number of years (1-3), summer salary (up to two years)
Technician/postdoc/grad student (1-3 years) (1 or 2 people)
Laboratory supplies and Equipment ($90-300k)
$500,000 microscope or promised funds to help purchase a microscope or funds to pay for time on a facility microscope.

As an absolute minimum, you need to know what you need to start your lab for the first year. If the institution's offer isn't in that range and the institution is unable to increase the offer, then you should seriously consider walking away from the job offer. This may sound especially difficult if this is the only offer you get, but you did not just do 5-12 years of post-college training to get a job that is underfunded and under resourced. Note that the story is different for some European institutions, positions are basically offered on the condition that you get external funding for startup. No funding, no job.

Remember that getting grants takes time. Unless you have a transition award, it will take at least six months and probably up to a year from the time that you apply for a grant and receive the money. So, unless you are exceptionally confident of your ability to bring in funding, your start-up is all the money that you will have to run your lab. With that timeline in mind, you would be better off with funding necessary to run your lab for 1.5 years. Many medical and private schools will have packages that cover your lab for two to five years. Additional funding can be negotiated, especially if you can make a

compelling case that your success depends on a minimum detailed and justified budget. Remember that the school wants you to succeed. The school is investing in you. It's a terrible bet to underfund a new hire's research.

What should a startup package include?

- Costs of equipment and reagents to start your lab and keep it running for at least 1 year and preferably 2-3 years.
- Funds for travel to meetings ($1000-2000/year) and for at least one publication a year (~$1-3000/year).
- Funds for core facilities (i.e. time on a microscope or sequencing facilities).
- Funds for lab personnel for at least 1 year and preferably 2-3.
- Funds for operations (i.e. computer hook-ups, email accounts, copier charges, etc.)
- Funds for all renovations or remodeling of your lab space. This is usually not money for your lab account, but this is a promise that the school will pay for the relevant renovations.
- Space in a -80°C freezer, cold room, etc.
- Animal housing and care.
- whatever else your research absolutely requires for success

4. Tenure and tenure-track positions. Some faculty searches are for non-tenure-track positions. If you're offered a non-tenure-track position, find out exactly what that means in practice. It might mean an annually renewed ("at will") contract, or renewal every few years without ever offering a permanent position. These positions take various forms: one-year visiting professorships with heavy teaching loads, instructor roles affiliated with a tenure-track mentor, or adjunct positions that typically come with no lab or funding but some access to departmental resources or even graduate students. Non-tenure-track can also mean you're allowed to apply for grants but can't take on the department's own graduate students. The job may be considerably less attractive without the full benefits tenure-track faculty enjoy.

For tenure-track jobs, the nature of tenure differs significantly between schools. Many schools consider you for tenure after a 5-7 year period. Typically, a package of your accomplishments and contributions related to funding, publications, teaching, committees, and other service will be assembled, often in conjunction with your department chair. Your materials will be reviewed by a tenure committee, which will make a recommendation that the Dean, school President, and Board of Overseers must then approve.

What you get with tenure also varies between institutions. You may have a guaranteed minimal salary or a permanent job or near absolute academic freedom to pursue risky or even pseudoscientific research topics. Or you may only get the distinction of being able to say you have tenure without any obvious material benefits. You could still lose your salary or lab if you lose grant funding. Tenure may mean that maintaining your job will entail a heavier teaching and committee load. The importance of tenure varies between institutions. For example, even though tenure was distinct from promotion at my institution, there was also no "up-and-out" policy. Failure to get tenure did not automatically mean that a faculty member must leave. At other institutions, not getting

promoted to associate professor is the end of the line at those institutions and you will have to find another job. Finally, it should be mentioned that "tenure-track" doesn't always mean you really have a chance at tenure. At some institutions, tenure is only granted to individuals considered the top members in their fields. Without three R01 grants, frequent *Science*/*Nature*/*Cell* papers, etc., you wouldn't have a hope of being seriously considered for tenure at such places. Given this spectrum of tenure, you should request a copy of the school's tenure policy and be very clear on what you are or are not getting with a tenure-track offer.

5. Perks. These are items that are unlikely to be included in your initial letter of offer, but that you can ask for, especially if you have other letters of offer. Before you start requesting these items, rank them and decide which are most crucial and which are most likely to be granted. You want and need to be a shrewd negotiator.

- a parking space (paid for the first year or two, if you are feeling bold).
- reduced cost or free tuition for your significant other at one of the institution's graduate schools, assuming your significant other has sufficient grades and test scores to be admitted to the program.
- a job for your significant other or at least help finding a job
- more lab space (you'll appreciate this when your lab begins to expand).
- your own -80°C freezer and sufficient space
- funds to attend additional meetings
- moving costs for both your house and any lab equipment you may have.
- funds for house hunting trips for both you and your significant other.
- a dishwasher/glass cleaner
- relief from teaching duties or a TA for your courses
- a later start date
- a service contract for a piece of equipment (extremely valuable!)

After the phone conversations and emails, you will receive a draft letter of offer. It will state the terms of the offer. Look the letter over carefully and determine whether anything is missing and whether you can ask for more. This is your last chance to increase your package. Remember that the school has interviewed several people and you are the top choice. They want you! You can make requests and it is not unexpected.

If you do have multiple offers, you can ask the school to match or beat your best offer. Medical schools and undergraduate universities have different sets of resources and expectations. Undergraduate schools will typically offer lower salaries with smaller startup packages and larger teaching requirements. Be careful about comparing salaries with medical schools, as the undergrad school may not be able to match such an offer. At the same time, a smaller startup package may have lower grant funding requirements, while a generous package might expect 50-100% salary support through grants within five years. Bear in mind that the undergraduate salary is usually 9 months and you can get an additional 1/4 (or "summer salary") with grants. You might ask for one or two years of "summer salary" as part of your startup package.

If you have multiple offers and you can rule out interest in some of the offers, immediately let those schools know that you appreciate the offer, but are respectfully

declining them to pursue another offer. It is important to maintain good relations with everyone you meet. You never know whether you may get a future offer from that school or someone from that school could become your new department chair or dean or could review your grants and manuscripts. One of my general rules in life is: *Make no enemies in Science.* I can't overstate this one.

Do ask to have your teaching load reduced for at least the first term and preferably for one year. That said, once you arrive, see if you can give one or two guest lectures in a fall semester graduate course. This is a great way to attract rotating graduate students to your lab.

Make sure the letter includes: salary, benefits, start date, teaching load, start-up amount (and whether it includes your salary or is separate), lab space, whether you'll be moved into a new building once finished, your title, whether the position is tenure-track, and the length of your initial contract (usually three years). Also check whether your start-up package has a "sunset date" (a deadline to spend the funds or lose them). Sunset dates are common now and often non-negotiable, but push to extend one as far as you can anyway, since unrestricted start-up funds are extremely useful for things grants won't cover, like a school-mandated student stipend raise or equipment repair.

Once you have received a letter that satisfactorily addresses your concerns, sign the letter and you now have a faculty position. **Congratulations!!!!**

To Take or not to Take a Job

Surprisingly, the most stressful part of the whole process can be choosing between job offers or deciding whether to take the one offer you get. The two major questions to ask yourself are:

1. Will you keep developing in this environment? Can you identify people who will mentor you? It's genuinely valuable for young investigators to have a senior colleague read their manuscripts and grant proposals and give constructive feedback. Think of a new faculty position as an advanced postdoc. You'll be far more independent, but still have plenty to learn about managing a lab, mentoring students, writing grants, and serving on committees. A good institution will help you through that transition. Hopefully, your interviews gave you a sense of how well the department supports new faculty. One useful metric was how happy the associate professors (especially the recently promoted ones) were.

2. Will you be able to do your research? Are teaching expectations high, e.g., a whole course or more per term? Does the department have the resources and potential collaborators you'll need? One useful measure of the biomedical research environment is how many people are NIH funded. Search your institution in the NIH RePORTER database (https://reporter.nih.gov). If few names come up, you're unlikely to get much grant mentoring. More importantly, the institution may not be especially competitive for research funding. You might still have a job, just not necessarily the one you thought you were applying for.

That said, I've written this assuming your goal is to do biomedical research. If you are doing traditional evolution/ecology biology or enjoy teaching (I do, too), then your

criteria may be different and that's fine. You just need to determine if your expectations align with the job you are being offered.

If you cannot answer yes to both of these two questions, you need to seriously consider whether it is worth taking the job.

During my faculty search, I received multiple job offers (six). I immediately declined two job offers. I was flattered by the offers, but did not see myself thriving at those institutions. The other four offers were very seriously considered. I thought about where I wanted to live, where my wife wanted to live, affordability, quality of the research environment, teaching load, the start-up package, and various intangibles. As someone raised in a small town on the Oregon Coast, I had never seriously thought about living in the Bronx, much less New York City. However, during my interviews, I saw parts of the Bronx that I found very attractive. I ended up living in the Bronx on City Island and loved it.

For me, the crucial deciding factors were ones that required a different perspective. I went into the process imagining I was going to get my dream job. Getting the job was the end goal, but it was just the beginning. I chose my faculty job for two reasons. First, it was the one interview that I found truly challenging. Some of my interviewers at Einstein, while very pleasant, left me feeling intimidated both by their intellect and their scientific accomplishments. I felt that I needed this environment to push me to be an ever better scientist. The second reason was because of some great advice I received from some mentors at the NIH. My mentors emphasized the importance of getting one's first R01 grant funded from the NIH and how this grant would make it possible to advance at my institution or to move to another institution, if I wanted. As I said earlier, your assistant professor position is like doing an advanced postdoc. You do get more freedom and responsibility. You also still have a lot to learn. And, jobs must be viewed as dynamic. Institutions change and you change. You could be less enamored and/or you may not fit as well with the future of direction of the institution. Or you could get an amazing offer from another institution. Or life happens and you need to live somewhere else to support your spouse, take care of your parents, etc. Or you realize you now want to devote yourself to helping early career scientists navigate their careers. When I took my faculty position in 2004, this possibility was nowhere on my radar.

During some of my interviews at some institutions, it became apparent that faculty felt trapped in their environment. They were unable to leave due to lack of grant support and inadequate time for developing a body of scholarly achievement (papers), due to heavy teaching loads. I wanted to ensure I had the best chance for succeeding. I got the flexibility and support I needed at Einstein and it provided peace of mind. In hindsight, I can say that I made the right decision for that period of my career.

Chapter 9. Acceptance and Preparing for Your New Job

Once the school has met your requests to the best of its ability, you have everything the school has promised IN WRITING, you are satisfied that you have access to everything you will need to succeed in your research, and you are convinced that this will be a good, if not great, job, you are ready to sign the letter of offer and accept the job.
CONGRATULATIONS!

The Job that Wasn't

I want to share a cautionary tale. Despite the apparent happy resolution of the exhausting job search process, there are (very) rare instances when things can still go horribly awry. It's not my intent to scare readers, but even when everything is done right, it can still go wrong. True story. A friend, Dr. W, interviewed for a position and was offered the job. Dr. W left his postdoc position after a going away party and arrived at his new institution, except… there was no new job. The person that offered the position was no longer Chair and had left. The new Chair claimed that the position had not been negotiated in good faith by the former Chair and the position had never been approved by the Dean. It was unclear whether a lawsuit would have been fruitful, but the bottom line was that there was no job! Dr. W was able to resume his position at his postdoctoral institution and worked a few more years until he found a new faculty position and went onto a highly successful career. My only suggestion in light of this bizarre situation is to make additional visits to your new institution between the time the letter is signed and before quitting your postdoc position and moving. It's helpful to at least see that your future lab space is being prepared for you and that your future department is really expecting you. Keep in frequent contact with your chair and future colleagues.

As soon as you accept the job, you'll be at least as busy as you were applying for it. Here's a to-do list. I suggest dividing into things to handle now and things to handle at least a month before you leave your current position.

To do immediately after accepting your new job

-Thank your significant other/spouse for all of their support during this long process. It's OK to thank them frequently throughout the process, too.

-Notify and thank everyone that wrote you a letter of reference that you have taken the job. A thank you note is obligatory. These people said good things about you and sent tens of letters for you. A thank you note is the least you can do for them.

-Begin hunting for an apartment or house. I encourage you to get an apartment, as spending time in a place will reveal things like traffic/commuting, shopping, schools, etc.

-Begin making arrangements for special research needs (i.e. housing mice, zebrafish, adapting room for a microscope, etc.)

-Inquire with your new department and HR for considerations for hiring postdocs/techs and potentially begin hunting for your first employee. Note that different positions may be hired (and dismissed) differently. There may be a defined process for dismissal. There may be a union. There may be a trial period during which someone can be dismissed without cause. You may need to use specific language in any advertisements. You should also figure out how much different positions cost, including benefits, like health care (typically 33% of salary, on top of salary). My point is that hiring is complex.

-Identify all foundation fellowships for which you will be eligible and submission dates (usually in Fall or early winter). If you are preparing application materials before you arrive, you'll be ready to submit in your first year.

-Find out how soon you can begin ordering and if there is a place to send everything. You will want to have big ticket items like incubators and tissue culture hoods ordered to arrive by the time you begin.

-If you couldn't get out of teaching your first term, find out what will be expected, what lesson plans you may need to design and get started.

At least one month before you go

-Collect aliquots of all plasmids and antibodies you plan to bring with you

-Frozen perms of cell lines

-Make arrangements to have emails forwarded to new school email

-Set up email account at your new institution

-Make arrangements with movers and/or reserve moving truck. First find out your new institution’s policies on supporting moves. They may have a preferred moving company or may have specific requirements.

-Notify post office of forwarding address

-Start packing your stuff for the big move

-Make final push on data collection and writing of manuscripts as it may be a long time before anyone does anything with your postdoc projects again. Note that it is not uncommon for new faculty to return to their postdoc lab to collect data to wrap up a project during the first year.

-Savor your last day as a postdoc.

APPENDICES

In the following pages, I have included examples of both my own application materials, as well as generously shared materials from other individuals that obtained faculty positions at graduate research institutions. While there is no single uniform format, the following examples were all considered sufficiently acceptable by search committees to earn invitations for interviews (during the period of 2003-2010).

Today, I would write a stronger Research Proposal. My original document spent too much space on my postdoc work and was too open ended in my future directions. I needed at least one or two candidate proteins to make the second aim more concrete and persuasive. It was something that I today would criticize as a "screen." A good research proposal articulates a question with defined anticipated outcomes. It's difficult to predict what one will get with a screen. The information in my postdoc work was not useless to include. Rather, I would have tried to incorporate more of it as preliminary data in the future directions. Same information, but more strategically leveraged as being well prepared to launch my new lab.

A. Sample Faculty Position Advertisements

FACULTY POSITIONS IN IMAGING AND CELL BIOLOGY IN
THE GRUSS-LIPPER BIOPHOTONICS CENTER

Innovative and creative scientists are invited to apply for faculty positions at any level in the Biophotonics Center of the Albert Einstein College of Medicine. New space is being constructed to expand the Biophotonics Center into the Price Center for Genetic and Translational Medicine, a new building on campus to open by the end of 2007. Members will be tenured, or tenure-track faculty in the Department of Anatomy and Structural Biology. Candidates are expected to have a background in any of the following: Biophysics, Physics, Electrical Engineering, Biology or Chemistry, but with a research focus in microscopy and imaging as related to the cell biology of human disease. The facilities in the Price Center for Genetic and Translational Medicine will include chemical genomics, bioinformatics and computational biology, human genetics, microarray and sequencing, protein chemistry and proteomics, gene therapy and transgenic mice. The Biophotonics Center will also be expanding an Innovation Laboratory into the Price Center including a microscope fabrication facility, laser workshop, a multiphoton microscope, rapid live cell imaging microscope, single molecule detection, and optical and software engineering support. The Biophotonics Center also maintains a service component, the Analytical Imaging Facility, which includes comprehensive light, electron and cryo-electron microscopy services.

Please send letter of introduction, curriculum vitae, research plan and three letters of recommendation to:

Biophotonics Search Committee
c/o Lillian Molina, Administrator
Albert Einstein College of Medicine
1300 Morris Park Avenue
Forchheimer 620
Bronx, NY 10461

TENURED/TENURE-TRACK FACULTY POSITIONS (open rank)
The newly expanded **Center for Membrane and Cell Physiology** at the University of Virginia invites applications for tenured/tenure-track positions in High-Resolution Live-Cell and Tissue Imaging. Live-cell and super-resolution imaging are undergoing a revolution and the University of Virginia seeks to position itself at the forefront of these developments by building a team of creative and highly collaborative scientists developing and employing such methods to solve important biomedical problems. Tenure status and rank of the positions will be dependent on qualifications. Incumbents will be resident members of the Center for Membrane and Cell Physiology and will also have an appointment in a basic science or clinical department of the UVa School of Medicine. Outstanding opportunities exist to collaborate with structural, computational, cardiovascular, cancer, developmental, cell, and chemical biologists and neuroscientists in a highly interactive research environment at the University of Virginia. Competitive start-up packages will be offered.

The Department of Biochemistry and Molecular Biology at the Louisiana State University Health Sciences Center in New Orleans, LA (**http://www.medschool.lsuhsc.edu/biochemistry/**) seeks candidates with successful ongoing research programs to apply for a tenure track faculty position at the associate or full professor level. Candidates should have a strong record of research accomplishments, lead an active nationally-funded research program, and have a vision, as well as a commitment to establish collaborative research ventures. Expertise in all areas of biochemistry or molecular biology will be considered, but special consideration will be given to those that complement the existing research strengths of the department which include cell regulation, cancer biology, and structural biology.

B1. Example of the author's postdoctoral CV (original version)

Erik Lee Snapp, Ph.D.
Building 18T Room 101
Cell Biology and Metabolism Branch
National Institutes of Child Health and Human Development
National Institutes of Health
Bethesda, MD 20892
(301)-496-5189
(301)-402-0078 FAX
snappe@mail.nih.gov

EDUCATION

1993-1999 **Ph.D., laboratory of Dr. Scott Landfear**
Dept. of Molecular Microbiology and Immunology
Oregon Health Sciences University Portland, OR 97201
Thesis: Differential Targeting of Glucose Transporter Isoforms in *Leishmania enriettii*.

1985-1989 **B.A. (Biology)**
Harvard University, Cambridge, MA

EMPLOYMENT

1999-2003 **Postdoctoral Fellow, laboratory of Dr. Jennifer Lippincott-Schwartz**
Cell Biology and Metabolism Branch, NICHD, NIH, Bethesda, MD
Research interests: 1) Dynamics, organization, and maintenance of the endoplasmic reticulum, 2) Retention of misfolded proteins in the ER, 3) Organization of the translocon, 4) Fluorescence microscopy methods

HONORS AND AWARDS

- FARE Travel Awards 2001-2002 and 2002-2003.
- PRAT Fellowship (Pharmacology Research Associate Training)(1999-2002)
- Henry Sears Fellowship 1996
- NRSA Training Grant (Interactions at the Microbe/Host Interface)(1995-1998)
- Tartar Fellowship 1995

TEACHING

- Faculty at Practical Course in GFP and Advanced Microscopy at the Max Planck Institute for Biophysical Chemistry at Gottingen, Germany, Sept. 18-27, 2000.
- Teaching Assistant for Medical Microbiology laboratory for medical students, Spring 1995, 1996, and 1997 at Oregon Health Sciences University.

OTHER PROFESSIONAL ACTIVITIES

- Regular reviewer for Journal of Cell Science (2000-present)
- Graduate Student Research Forum Funding Coordinator (1996-1997)
- Graduate Student Council (Sept. 1994 to Sept. 1996)

- Graduate Student Research Forum Co-chair (1995-1996)
- Graduate Student Organization Representative (Sept. 1993-Sept. 1994).
- NERDS/Kids Science Outreach Volunteer 1994

PUBLICATIONS

Snapp, E. and Hegde, R. S. Application of antibody-based FRET to probe oligomeric complex organization. in: Bonafacino, J., Dasso, M., Harford, J., Lippincott-Schwartz, J., Yamada, K. editors. Morgan, K. S. series editor. In Current Protocols in Cell Biology. John Wiley & Sons, Inc. New York. in preparation.

Snapp, E., Iida, T., Frescas, D., Lippincott-Schwartz, J., and Lilly, M. The *Drosophila* fusome contains highly interconnected endoplasmic reticulum. In preparation.

Snapp, E., Reinhart, G., Bogert, B., Lippincott-Schwartz, J., and Hegde, R. Structural dynamics of the protein translocon in the endoplasmic reticulum of mammalian cells. under review.

Snapp, E., Hegde, R., Colombo, S., Borgese, N., Francolini, M., and Lippincott-Schwartz, J. Self-organization of stacked cisternae from branching endoplasmic reticulum in living cells. J. Cell Biol. accepted.

Snapp, E. 2002. ER biogenesis: proliferation and differentiation. *The Biogenesis of Cellular Organelles*. ed. Mullins, C. Landes Bioscience. Georgetown, TX. In press.

Snapp, E., Altan, N., and Lippincott-Schwartz, J. 2003. Measuring protein mobility by photobleaching GFP-chimeras in living cells. Unit 21.1 in: Bonafacino, J., Dasso, M., Harford, J., Lippincott-Schwartz, J., Yamada, K. editors. Morgan, K. S. series editor. In Current Protocols in Cell Biology. John Wiley & Sons, Inc. New York.

Nikonov, A., **Snapp, E.**, Lippincott-Schwartz, J., and Kreibich, G. 2002. Active translocon complexes labeled with GFP-Dad1 diffuse slowly as large polysome arrays in the endoplasmic reticulum. *J. Cell Biol*. 158:497-506.

Brandizzi, F., **Snapp, E**., Roberts, A., Lippincott-Schwartz, J., and Hawes, C. 2002. Membrane protein transport between the endoplasmic reticulum and the Golgi in tobacco leaves is energy dependent but cytoskeleton independent: evidence from selective photobleaching. *Plant Cell*. 14:1293-1309.

Lippincott-Schwartz, J., **Snapp, E.**, and Kenworthy, A. 2001. Studying protein dynamics in living cells. *Nat. Rev. Mol. Cell Biol*. 2:444-456.

Nehls, S., **Snapp, E. L.**, Cole, N. B., Zaal, K. J .M., Kenworthy, A. K., Roberts, T. H., Ellenberg, J., Presley, J. F., Siggia, E., and J. Lippincott-Schwartz. 2000. Dynamics and retention of misfolded proteins in native ER membranes. *Nat. Cell Biol*. 2:288-295.

Snapp, E. L. and S. M. Landfear. 1999. Characterization of a targeting motif for a flagellar membrane protein in *Leishmania enriettii*. *J. Biol. Chem.* 274: 29543-29548.

Snapp, E. L. and S. M. Landfear. 1997. Cytoskeletal association is important for differential targeting of glucose transporter isoforms in *Leishmania enriettii*. *J. Cell Biol.* 139:1775-1783.

RECENT ABSTRACTS

Self-organization of stacked cisternae from branching endoplasmic reticulum in living cells. Cellular Dynamics Keystone Meeting. Talk and poster. Feb. 2003.

Self-organization of stacked cisternae from branching endoplasmic reticulum in living cells. ASCB Meeting. Poster. Dec. 2002.

Ribosomes organize and maintain fully assembled translocons at the mammalian endoplasmic reticulum. Poster. ASCB Meeting. Dec. 2002.

The *Drosophila* fusome contains highly interconnected endoplasmic reticulum. Germ Cells meeting Cold Spring Harbor. Poster. Oct. 2002.

Remodeling of the endoplasmic reticulum in living cells. Poster. ASCB Dec. 2001.

Mobility and retention of misfolded proteins in the endoplasmic reticulum of living cells. ASCB Meeting (poster) Dec. 2000.

Quality control of misfolded proteins in the ER of living cells. Protein Folding FASEB meeting at Saxtons River, VT. (talk) July 2000.

INVITED TALKS

Studying Protein and Organelle Dynamics with Photobleaching Technology. Society of Developmental Biology Annual Meeting. July, 2003.

Using FRET to probe organization of the translocon in cells. LIMB Seminar series. May 2003.

Remodeling and Differentiation of the Endoplasmic Reticulum in Living Cells. Laboratory of Cell Biology Thursday Seminar Series. NHLBI, NIH. March 2003.

REFERENCES

List names, addresses, telephone, FAX, and emails of at least three references.

How I would reformat my CV today:

Erik Lee Snapp, Ph.D.
Janelia Research Campus
19700 Helix Drive
Ashburn, VA 20147
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snappe@janelia.hhmi.org
https://www.linkedin.com/in/erik-snapp-98588242/

EDUCATION

1993-1999 **Ph.D., laboratory of Dr. Scott Landfear**
Dept. of Molecular Microbiology and Immunology
Oregon Health Sciences University Portland, OR 97201
Thesis: Differential Targeting of Glucose Transporter Isoforms in *Leishmania enriettii.*

1985-1989 **B.A. (Biology)**
Harvard University, Cambridge, MA

EMPLOYMENT

1999-2004 **Postdoctoral Fellow, laboratory of Dr. Jennifer Lippincott-Schwartz** Cell Biology and Metabolism Branch, NICHD, NIH, Bethesda, MD

HONORS AND AWARDS

- NICHD Annual Report Cover 2003
- FARE Travel Awards 2001-2002 and 2002-2003
- NIH IRTA Fellow (2002-2004)
- PRAT Fellowship (Pharmacology Research Associate Training)(1999-2002)
- Henry Sears Fellowship 1996
- NRSA Training Grant (Interactions at the Microbe/Host Interface)(1995-1998)
- Tartar Fellowship 1995

TEACHING

Academic Courses and Workshops

- Teaching Assistant for Medical Microbiology laboratory for medical students, Spring 1995, 1996, and 1997 at Oregon Health Sciences University.

Scientific Workshops

- Faculty and lecturer for Photobleaching and Protein Dynamics Workshop at Lombardi Cancer Center at Georgetown University, June 18, 2004.
- Faculty at LSM 510 Advanced Imaging Microscopy Workshop at the National Institutes of Health, April 15-16, 2004.
- Faculty at Advanced Techniques in Confocal, Live Cell & Molecular Imaging Workshop at Duke University Medical Center, January 20-22, 2004.
- Faculty at Practical Course in GFP and Advanced Microscopy at the Max Planck Institute for Biophysical Chemistry at Gottingen, Germany, Sept. 18-27, 2000.

OTHER PROFESSIONAL ACTIVITIES

- Ad hoc reviewer for J. Cell Sci. (2000-present), Mol. Biol. Cell (2000-present), Verified Publons Reviewer: publons.com**/a/1183069/**.
- OHSU Graduate Student Council (Sept. 1994 to Sept. 1996)
- OHSU Graduate Student Research Forum Co-chair (1995-1996)

PUBLICATIONS ORCID 0000-0001-9482-2272 h-index 47 (according to Google scholar)

Journal Articles, Editorials, and Reviews

1. Snapp EL and Landfear SM. 1997. Cytoskeletal association is important for differential targeting of glucose transporter isoforms in *Leishmania enriettii*. *J Cell Biol.* 139:1775-1783. PMCID: PMC2132635

2. Snapp EL and Landfear SM. 1999. Characterization of a targeting motif for a flagellar membrane protein in *Leishmania enriettii*. *J Biol Chem.* 274: 29543-29548. no PMCID

3. Nehls S, **Snapp EL**, Cole NB, Zaal KJM, Kenworthy AK, Roberts TH, Ellenberg J, Presley JF, Siggia E, and Lippincott-Schwartz J. 2000. Dynamics and retention of misfolded proteins in native ER membranes. *Nat Cell Biol.* 2:288-295. no PMCID.

4. Lippincott-Schwartz J, **Snapp E**, and Kenworthy A. 2001. Studying protein dynamics in living cells. *Nat Rev Mol Cell Biol.* 2:444-456. no PMCID.

5. Brandizzi F, **Snapp EL,** Roberts A, Lippincott-Schwartz J, and Hawes C. 2002. Membrane protein transport between the endoplasmic reticulum and the Golgi in tobacco leaves is energy dependent but cytoskeleton independent: evidence from selective photobleaching. *Plant Cell*. 14:1293-1309. PMCID: PMC150781.

6. Nikonov A, **Snapp E**, Lippincott-Schwartz J, and Kreibich G. 2002. Active translocon complexes labeled with GFP-Dad1 diffuse slowly as large polysome arrays in the endoplasmic reticulum. *J Cell Biol.* 158:497-506. PMCID: PMC2173836.

7. Snapp EL, Hegde R, Francolini M, Lombardo F, Colombo S, Pedrazzini E, Borgese N, and Lippincott-Schwartz J. 2003. Formation of stacked cisternae by low affinity protein interactions. *J Cell Biol.* 163:257-269. PMCID: PMC2173526. **Journal Cover.**

8. Snapp EL, Reinhart G, Bogert B, Lippincott-Schwartz J, and Hegde R. 2004. The organization of engaged and quiescent translocons in the endoplasmic reticulum of mammalian cells. *J Cell Biol.* 164:997-1007. PMCID: PMC2172055.

9. daSilva LLP, **Snapp EL**, Denecke J, Lippincott-Schwartz J, Hawes C, and Brandizzi F. 2004. ER exit sites and Golgi bodies in plant cells form mobile, secretory units. *Plant Cell*. 16:1753-1771. PMCID: PMC514159.

10. Snapp EL, Iida, T., Frescas, D., Lippincott-Schwartz, J., and Lilly, M. 2004. The fusome mediates intercellular ER connectivity in *Drosophila* ovarian cysts. *Mol Biol Cell.* 15:4512-4521. PMCID: PMC519145.

Book and Methods Chapters

1. Snapp EL, Altan N, and Lippincott-Schwartz J. 2003. Measuring protein mobility by photobleaching GFP-chimeras in living cells. Unit 21.1: Bonifacino, J., Dasso, M., Harford, J., Lippincott-Schwartz, J., Yamada, K. editors. Morgan, K. S. series editor. in Current Protocols in Cell Biology. John Wiley & Sons, Inc. New York. no PMCID.

2. Snapp EL. 2004. ER biogenesis: proliferation and differentiation. *The Biogenesis of Cellular Organelles*. Molecular Biology Intelligence Unit. ed. Mullins, C. Landes Bioscience. Georgetown, TX. Kluwer Academic/Plenum Publishers. New York, NY. pp.63-95.

3. Lippincott-Schwartz J and **Snapp EL.** 2004. Imaging of membrane systems and membrane traffic in living cells. eds. Goldman, R. and Spector, D. *Live Cell Imaging: A Laboratory Manual.* Cold Spring Harbor Press. Cold Spring Harbor, NY.

4. Snapp EL. 2005. Design and Use of Fluorescent Fusion Proteins in Cell Biology. Unit 21.4. Bonifacino, J., Dasso, M., Harford, J., Lippincott-Schwartz, J., Yamada, K. editors. Morgan, K. S. series editor. In Current Protocols in Cell Biology. John Wiley & Sons, Inc. New York. PMCID: PMC2875081

Patents

1. Fusion Tags for Protein Expression. U.S. Issued Patent No.: 9,920,102. Issued March 20, 2018. Invented by EL Snapp and LM Costantini.

Other

1. Francolini M, **Snapp EL**, Borgese N. Organized smooth endoplasmic reticulum. ASCB Image & Video Library. May 2007:CYT-81. (http://cellimages.ascb.org/u?/p4041coll7,124).

2. Snapp EL. Back Cover "Einstein Images" for Einstein Magazine. Winter/Spring 2014.

3. Costantini LM and **Snapp EL**. 2015. Avoiding the Dark Side of Fluorescent Protein Fusions. Addgene Blog (http://blog.addgene.org/avoiding-the-dark-side-of-fluorescent-protein-fusions-with-mox-fps). *1,900 downloads as of December 2019.*

INVITED RESEARCH TALKS

Probing the organization of membrane protein complexes with FRET. Oregon Health Sciences University. June 2004.

Photobleaching methods: FRAP, FLIP, and other four letter F-words. LSM 510 Advanced Imaging Microscopy Workshop, NIH. April 2004.

Photobleaching, Photoactivation, and new Fluorescent Proteins. Advanced Techniques in Confocal, Live Cell & Molecular Imaging. Duke University. Jan. 2004

Probing Membrane Protein Organization with Acceptor Photobleaching FRET. Leica Live Cell Imaging Workshop. NIH. Dec. 2003.

Studying Protein and Organelle Dynamics with Photobleaching Technology. Society of Developmental Biology Annual Meeting. Aug. 2003.

Using FRET to probe organization of the translocon in cells. LIMB, NIH. May 2003.

Remodeling and Differentiation of the Endoplasmic Reticulum in Living Cells. Laboratory of Cell Biology Seminar Series. NHLBI, NIH. March 2003.

Remodeling and Differentiation of the Endoplasmic Reticulum in living cells. Tufts Medical School, Dept. of Physiology Feb. 2003.

RECENT ABSTRACTS AND MEETING PRESENTATIONS

Monitoring substrate engagement by chaperones in living cells. ASCB meeting. Minisymposium Talk. Dec. 2004.

Monitoring substrate engagement by chaperones in living cells. Protein Folding FASEB meeting. Selected for short talk and poster. July 2004.

Self-organization of stacked cisternae from branching endoplasmic reticulum in living cells. Cellular Dynamics Keystone Meeting. Selected for talk and poster. Feb. 2003.

Self-organization of stacked cisternae from branching endoplasmic reticulum in living cells. ASCB Meeting. Poster. Dec. 2002.

Ribosomes organize and maintain fully assembled translocons at the mammalian endoplasmic reticulum. ASCB Meeting. Poster. Dec. 2002.

The *Drosophila* fusome contains highly interconnected endoplasmic reticulum. Germ Cells meeting Cold Spring Harbor. Poster. Oct. 2002.

Quality control of misfolded proteins in the ER of living cells. Protein Folding FASEB meeting at Saxtons River, VT. Talk. July 2000.

PAST RESEARCH SUPPORT

1R01NS092466 R01 Spray,David P.I. 09/01/2015-8/31/2020 1.2 *cal*
The Astrocyte Nexus: Cx43 protein interactions

MERCK Contract / Wolkoff, P.I., Snapp co-PI 5/01/12-10/31/13 *3.0 cal*
"Cell Biology of siRNA Targeting to Hepatocytes"

1R01GM086530-01 ER Chaperone Availability in Cells During Homeostasis and Misfolded Protein Stress
Snapp (PI). 10/01/09-08/31/12

Endoplasmic Reticulum Stress and Regulation of HTT Levels and Aggregation.
HighQ Society. Discovery Initiative. 08/01/08-07/31/09

AG-NS-0283 Ellison Medical Foundation New Scholar in Aging 08/01/05-07/31/09
Age-related oxidative damage and the ER folding environment

R21 DK074650-01 Polycystic liver disease and ER quality control. 05/01/06-04/30/08
Snapp (PI)

LAB MEMBERS

High School Interns

Xxxxxxxx	Summers 2005-7
xxxxxxx	2012

Undergraduate Interns

xxxxxx (Syracuse University)	Summer 2006
xxxxxxxx (Queens College)	Summer 2011

B2. Example of a CV
Generously provided by Samara Reck-Peterson

Samara L. Reck-Peterson, Ph.D.

x Street, San Francisco, CA 94158
555-555-5555 (lab) 555-555-5555 (cell)
xxx@ucsf.edu

EDUCATION

Ph.D. Cell Biology — 2000
Yale University, New Haven, CT

B.A. Biology — 1993
Honors in Independent Study
Carleton College, Northfield, MN

HONORS AND AWARDS

National Institutes of Health Postdoctoral Fellowship — 2002 - 2005
(Ruth L. Kirschstein National Research Service Award)

Teaching Assistant of the Year, Department of Molecular Cellular and Developmental Biology, Yale University — 1999

Prize Teaching Fellow, Yale College and the Graduate School of Arts and Sciences, Yale University — 1998

Physiology Course Student, Marine Biological Laboratories, Woods Hole, MA — 1994

RESEARCH EXPERIENCE

Postdoctoral Fellow, University of California San Francisco — 2001 - present
Department of Cellular and Molecular Pharmacology, San Francisco, CA
Laboratory of **Ronald Vale**
"*Cytoplasmic Dynein: Molecular Mechanism of Motility"*

Postdoctoral Fellow, **Stanford University** — 2001
Department of Pathology, Stanford, CA
Laboratory of **Gerald Crabtree**
"Artificial Dimerization to Create Novel Ubiquitination Substrates"

Graduate Student, **Yale University** — 1995 - 2000
Department of Cell Biology, New Haven, CT
Laboratories of **Mark Mooseker** and **Peter Novick**
"Functional, Biochemical and Biophysical Characterization of Myo2p,

a Class V Myosin of the Yeast Saccharomyces cerevisiae"

Undergraduate Research, Carleton College 1989 - 1993
Department of Biology, Northfield, MN
Laboratory of **Susan Singer**
"*Floral Determination in Nicotiana tabacum"*

UNIVERSITY SERVICE

Director of Postdoctoral Education, Dean's Office 2005 – present
UCSF School of Medicine, San Francisco, CA

- Developed programming with the Executive Dean of the Medical School, Keith Yamamoto
- Applied for and received funding from the Sandler Family Foundation and the Burroughs Wellcome Fund
- Began a new postdoctoral fellowship program funded by the Sandler Family Foundation to give 9 postdoctoral fellows seed money to develop independent research directions
- Co-organized and developed the first UCSF course on "Scientific Leadership and Laboratory Management"
- Created an award to recognize the creative and independent research contributions of UCSF postdoctoral fellows "The Dean's Postdoctoral Prize Lecture"
- Developed a website for the office: http://www.medschool.ucsf.edu/postdocs/
- Participated in the Science and Society Institute's workshop (sponsored by the Pew Charitable Trusts) "Media and Public Policy Training", Washington DC, September 18-21, 2005
- Participated in the Howard Hughes Medical Institute and Burroughs Welcome Fund "Course in Scientific Management", Bethesda, MD, June 6-10, 2005

UCSF Postdoctoral Fellow 2001 - present
UCSF School of Medicine, San Francisco, CA

- Founder and director of a seminar series "Genentech Hall Research in Progress Seminars" for postdocs and graduate students, now in its 4th year

TEACHING EXPERIENCE

Physiology Course 2006
Teaching Assistant for Ronald Vale
Marine Biological Laboratories, Woods Hole, MA

Cancer (First year medical school curriculum) 2003
UCSF Postdoctoral Teaching Fellow
UCSF School of Medicine, San Francisco, CA

Rotation student mentor (1 graduate student rotation project) 2002
UCSF School of Medicine, San Francisco, CA

Cell Biology and Pharmacology (First year medical school curriculum) 2002
UCSF Postdoctoral Teaching Fellow

UCSF School of Medicine, San Francisco, CA

Cell Biology of the Nucleus and Cytoplasm 1997 - 2000
Teaching Assistant, Molecular Cellular and Developmental Biology Dept.
Yale University, New Haven, CT

Rotation student mentor (5 graduate student rotation projects) 1997 - 2000
Yale University, New Haven, CT

Molecular Mechanisms of Disease 1999
Teaching Assistant, Cell Biology Dept.
Yale University, New Haven, CT

Advanced Seminars in Cell Biology 1998
Teaching Assistant, Cell Biology Dept.
Yale University, New Haven, CT

Physiology Course 1996 - 1998
Teaching Assistant for Mark Mooseker
Marine Biological Laboratories, Woods Hole, MA

Principles of Molecular, Cellular and Developmental Biology 1997
Teaching Assistant, Molecular Cellular and Developmental Biology Dept.
Yale University, New Haven, CT

Experimental Strategies in Cellular Biology 1996
Teaching Assistant, Molecular Cellular and Developmental Biology Dept.
Yale University, New Haven, CT

PUBLICATIONS

Reck-Peterson, S.L., Yildiz, Y., Carter, A.P., Gennerich, A., Zhang, N., and Vale, R.D. 2006. Single molecule analysis of dynein processivity and stepping behavior. *Cell, 126*: 335-348. **[**Commentaries on this research appeared in: *Cell, 126:* 335-348*, Nat. Rev. Mol. Cell Biol. 7*: 625, and *J. Cell Biol. 172:* 486-92, *Chemical and Engineering News 84(47): 70-73***]**

Shih JL, **Reck-Peterson SL**, Newitt R, Mooseker MS, Aebersold R, Herskowitz I. 2005. Cell polarity protein Spa2p associates with proteins involved in actin function in *Saccharomyces cerevisiae. Mol Biol Cell., 16:* 4595-4608.

Gibbons IR, Garbarino JE, Tan CE, **Reck-Peterson SL**, Vale RD, Carter AP. 2005. The affinity of the dynein microtubule-binding domain is modulated by the conformation of its coiled-coil stalk. *J. Biol. Chem., 280:* 23960-23965.

Reck-Peterson, SL, and Vale, RD. 2004. Molecular Dissection of the Roles of Nucleotide binding and hydrolysis in dynein AAA domains in *S. cerevisiae*. *Proc. Natl. Acad. Sci,* 101: 1491-1495.

Olave, I, **Reck-Peterson, SL**, Crabtree, GR. 2002. Nuclear actin and the regulation of chromatin and chromosomes. *Ann. Rev. Biochem.*, *71*: 755-781.

Reck-Peterson, SL, Tyska, MJ, Novick, PJ, and Mooseker, MS. 2001. The yeast class V myosins, Myo2p and Myo4p, are non-processive actin-based motors. *J. Cell Biol*., *153*, 1121-1126.

Reck-Peterson, SL, Provance, DW, Jr., Mooseker, MS, and Mercer, JA. 2000. Class V Myosins. *Biochem. Biophys. Acta*. *1496*, 36-51.

Karpova, TS, **Reck-Peterson, SL**, Elkind, NB, Mooseker, MS, Novick, PJ, and Cooper, JA. 2000. Role of actin and Myo2p in polarized secretion and growth of *Saccharomyces cerevisiae*. *Mol. Biol. Cell 11*, 1727-1737.

Reck-Peterson, SL, Novick, PJ, and Mooseker, MS. 1999. The tail of a yeast class V myosin, Myo2p, functions as a localization domain. *Mol. Biol. Cell 10*, 1001-1017.

INVITED SEMINARS

University of Idaho, Microbiology Molecular Biology and Biochemistry Dept., Moscow, ID	2006
National Postdoctoral Association Annual Meeting	2006
American Society of Cell Biology Annual Meeting	2005
Dynein Workshop, Kobe, Japan	2005
UCSF Genentech Hall Research in Progress Seminars	2005
Motile and Contractile Systems Gordon Research Conference	2005
UCSF Cell Biology Retreat	2003
Carleton College, Biology Dept., Northfield MN	2003

SELECTED MEETINGS

Biophysical Society Discussions. Molecular Motors: Point Counterpoint	2006
Cellular and Molecular Fungal Biology Gordon Research Conference	2006
Biophysical Society Annual Meeting	2005
Plant and Fungal Cytoskeleton Gordon Research Conference	2002, 2004
American Society of Cell Biology Annual Meeting	1997, 2000, 2003
Motile and Contractile Systems Gordon Research Conference	2003

.

REFERENCES

xxxx
Professor, Molecular Cellular and Developmental Biology Dept.
Yale University
address
555-555-5555
xxx@yale.edu

xxxx
Professor and Chair, Cellular and Molecular Pharmacology Dept.
HHMI Investigator
address
San Francisco, CA 94158
555-555-5555
xxx@cmp.ucsf.edu

xxx
Professor, xxx Dept.
Executive Vice Dean
address
555-555-5555
xxx@cmp.ucsf.edu

B3. CV Example 3
Generously provided by Dr. D. Thomas Rutkowski

CURRICULUM VITAE

D. Thomas Rutkowski, Ph.D.
Senior Research Specialist
Department of Biological Chemistry
University of Michigan Medical Center

Contact Information

e-mail: xxx@xxxxx
lab phone: (555) 555-5555
cell phone: (555) 555-5555
home phone: (555) 555-5555
lab fax: (555) 555-5555

University of Michigan Medical Center
1150 W. Medical Center Dr.
MSRB II xxx
Ann Arbor, MI
48109-0650

Citizenship: USA

Education

09/1993- 05/1997	B.S. in Biological Sciences with a concentration in Biotechnology Minor in Chemistry University of Delaware, Newark, DE, USA Thesis Advisor: David Francis, Ph.D. Senior Thesis Project: *Regulation of gene expression by inter-element promoter spacing in D. discoideum*
09/1997- 06/2002	Ph.D. in Cell Biology, Department of Biochemistry and Biophysics University of California San Francisco, San Francisco, CA, USA Thesis Advisor: Vishwanath Lingappa, M.D., Ph.D. Thesis: *A New Role for Signal Sequences: Regulation of Protein Biogenesis at the Endoplasmic Reticulum*

Postgraduate Training

07/2002-06/2007	Associate, Howard Hughes Medical Institute University of Michigan Medical Center Ann Arbor, MI, USA Laboratory of Randal Kaufman, Ph.D. Area of study: *Regulation of adaptation to chronic protein misfolding stress in development and disease*
07/2007-present	Senior Research Specialist, Department of Biological Chemistry University of Michigan Medical Center Ann Arbor, MI, USA Laboratory of Randal Kaufman, Ph.D. Area of study: *Regulation of adaptation to chronic protein misfolding stress in development and disease*

Teaching and Mentoring

Spring 1996	Undergraduate Teaching Assistant, Genetics lab, University of Delaware
Spring 1997	Undergraduate Teaching Assistant, Molecular and Cellular Biology lab, University of Delaware
Fall 1998	Teaching Assistant, Biochemistry for first year graduate students, University of California San Francisco
Fall 2003-present	Graduate and Undergraduate Mentoring:
(10/03-6/04)	Corey N. Miller, undergraduate student (Honors Thesis student) (now in M.D./Ph.D. program, UCSF)
(5/04-5/06)	Jack Li, undergraduate student (now in M.D. program, Univ. Michigan)
(1/05-5/07)	Kathryn M. Gunnison, graduate student (now in M.D. program, Rosalind Franklin Medical College)
(6/06-present)	Grace D.-Y. Yau, undergraduate student (ongoing)

Awards and Honors

09/1997-06/2002	Howard Hughes Medical Institute Predoctoral Fellowship in Biological Sciences

Scientific Memberships and Activities

09/1998-present	Howard Hughes Medical Institute "Ask-a-Scientist"
09/2001-present	American Society for Cell Biology
07/2002-present	Review or pre-review of more than two dozen manuscripts

Bibliography (most recent listed first)

Present work

Rutkowski, D. T. et al. Crosstalk between ER stress signaling and gluconeogenic and lipogenic pathways connects ER function to liver metabolism.

Publications

1. Wu, J.†, **Rutkowski, D. T.†,** Dubois, M., Swathirajan, J., Saunders, T., Wang, J., Song, B., Yau, G. D., and Kaufman, R. J. (2007) ATF6α optimizes long-term endoplasmic reticulum function to protect cells from chronic stress. ***Developmental Cell*** 13, 351-364

   †D.T.R. and J.W. contributed equally

2. **Rutkowski, D.T.**, and Kaufman, R. J. (2007) That which does not kill me makes me stronger: adapting to chronic ER Stress. ***Trends in Biochemical Sciences*** 32, 469-476.

3. **Rutkowski, D. T.†**, Kang, S.-W.†, Goodman, A. G., Garrison, J. L., Taunton, J., Katze, M. G., Kaufman, R. J., and Hegde, R. S. (2007) The role of $p58^{IPK}$ in protecting the stressed endoplasmic reticulum. ***Molecular Biology of the Cell*** 18, 3681-3691.
   †D.T.R. and S.-W.K. contributed equally

4. **Rutkowski, D.T**., Arnold, S. M., Miller, C. N., Wu, J., Li, J., Gunnison, K. M., Mori, K., Sadighi Akha, A. A., Raden, D., and Kaufman, R. J. (2006) Adaptation to ER stress is mediated by differential stabilities of pro-survival and pro-apoptotic mRNAs and proteins. ***PLoS Biology*** 4, e374.

5. Zhang, K., Shen, X., Wu, J., Sakaki, K., Saunders, T., **Rutkowski, D. T.**, Back, S. H., and Kaufman, R. J. (2006) Endoplasmic reticulum stress activates cleavage of CREBH to induce a systemic inflammatory response. ***Cell*** 124, 587-599.

6. **Rutkowski, D. T.**, and Lingappa, V. R. (2006) Membrane targeting of proteins. In ***Cells***, First Edition. Jones and Bartlett Publishers, Sudbury, MA (Benjamin Lewin, et al. eds.)

7. **Rutkowski, D. T.**, and Kaufman, R. J. (2004) A trip to the ER: coping with stress. ***Trends in Cell Biology*** 14, 20-28.

8. **Rutkowski, D. T.**, and Kaufman, R. J. (2003) All roads lead to ATF4. ***Developmental Cell***. 4, 442-444.

9. **Rutkowski, D. T.**, Ott, C. M., and Lingappa, V. R. (2003) Signal sequences initiate the pathway of maturation in the endoplasmic reticulum lumen. ***Journal of Biological Chemistry*** 278, 30365-30372.

10. Lingappa, V. R., **Rutkowski, D. T.**, Hegde, R. S., and Andersen, O. S. (2002) Conformational control through translocational regulation: a new view of secretory and membrane protein folding. ***Bioessays***. 24, 741-748.

11. **Rutkowski, D. T.**, Lingappa, V. R., and Hegde, R. S. (2001) Substrate-specific regulation of the ribosome-translocon junction by N-terminal signal sequences. ***Proc. Natl. Acad. Sci., USA***. 98, 7823-7828 (Track II).

Oral Presentations at International Meetings

1. **Rutkowski, D. T**., Wu, J., and Kaufman, R. J. (2007) ATF6α optimizes endoplasmic reticulum function to mediate adaptation to chronic stress. *FASEB Summer Research Conference: From Unfolded Proteins in the Endoplasmic Reticulum to Disease*, Indian Wells, CA.

2. **Rutkowski, D. T.**, Miller, C. N., Arnold, S. M., Li, J., Wu, J., Gunnison, K. M., and Kaufman, R. J. (2006) Posttranscriptional and posttranslational attenuation of gene

expression produces adaptation to ER stress. *Cold Spring Harbor Symposium: Molecular Chaperones and the Heat Shock Response*, Cold Spring Harbor, NY.

Other Presentations

1. Albert Einstein College of Medicine, Liver Center Seminar Series (2007) (invited speaker).

2. Keystone Symposium: Protein Misfolding Diseases, Breckenridge, CO (2006) (poster).

3. University of Michigan Medical School Department of Biological Chemistry Retreat, Kalamazoo, MI (2004 [poster], 2005 [poster], 2006 [talk], 2007 [talk])

4. Keystone Symposium: Conformational Diseases of the Secretory Pathway, Taos, NM (2003) (poster).

C1. Example of a Research Proposal

Generously provided by Dr. D. Thomas Rutkowski

Statement of Research Interests

My work focuses on the mechanisms by which cells adapt to chronic stress. My area of study is the unfolded protein response (UPR), which senses and responds to protein misfolding stress in the endoplasmic reticulum (ER). The ultimate goals of this work are to understand how stress responses shape the development and functionality of secretory organs, and how these responses can be therapeutically manipulated to treat human diseases of protein misfolding stress.

Previous Work

A core interest at all stages of my research career has been to understand how biological processes are regulated according to cellular need. As a graduate student, this motivation led to my discovery that the N-terminal signal sequences of secretory and membrane proteins encode information not just for the targeting of these proteins to the ER, but also for regulating their faithful topology[1] and maturation[2] once targeted. These and related newly-defined roles for signal sequences have been subsequently shown to impact processes as disparate as hormone responsiveness, pharmacological sensitivity, and global secretory pathway influx during stress[3].

My postdoctoral work has been focused on addressing the question of how cells adapt to physiological and pathological protein misfolding stresses rather than succumbing to them. My model system is ER stress, which defines any perturbation that compromises the ability of the ER to properly fold and process proteins. The UPR, like all stress response pathways, is marked by the simultaneous activation of both adaptive signaling cascades that help alleviate stress and apoptotic (i.e., death-promoting) cascades. How a cell can selectively initiate and perpetuate the adaptive components of a stress response without bringing about its own execution is not understood.

> The mechanisms that underlie adaptation are critical to both pathology and normal development and organ function[4]. For example: Type II diabetes is associated with ER stress in pancreatic β cells, and ER stress-induced apoptosis likely contributes to β cell failure in this disease. Yet Type II diabetes is a chronic condition, manifesting over many years. Thus, most β cells must adapt to the stress of increased insulin production. As a counterpoint, UPR activation is also implicated in both viral infections and cancer, circumstances in which the adaptive components of the response have likely been hijacked without initiation of cell death. Even normal physiology requires cells to adapt to stress: an intact UPR is necessary for the development of secretory cells such as B-lymphocytes, hepatocytes, and pancreatic acinar cells. Despite the physiological importance of adaptation, no framework previously existed for understanding how an activated UPR can lead to survival and adaptation over death because an adaptive UPR had not been experimentally reconstituted. My postdoctoral work has led to important mechanistic insights into this process that will drive my research as an independent investigator.

The UPR senses ER stress by the action of three ER-resident transmembrane proteins—ATF6α, PERK, and IRE1α. These molecules are activated by ER stress, and each initiates signaling cascades that result in transcriptional upregulation of genes that facilitate ER protein processing. I was able to successfully reconstitute an adaptive response in a simple and tractable in vitro system. From this system, I found that an adaptive response is qualitatively distinct from the much-better characterized response to severe stress[5]. Specifically, the ATF6α, PERK, and IRE1α pathways are all activated by stresses of both types. However, the upregulation of downstream apoptotic cascades

is suppressed when adaptation occurs, yet the upregulation of genes that improve protein folding persists. The mechanism for this selectivity is the rapid degradation of pro-apoptotic mRNAs and proteins. If the UPR-dependent enhancement of protein folding in the ER[6] is able to correct the protein folding problem, further UPR signaling is attenuated and apoptosis is not executed. Thus, the UPR is structured to make apoptotic cascades directly responsive to stress, while improvements in protein folding are longer-lasting and protect the cell from long-term insult. I found this general mechanism of adaptation to apply to both pharmacological and genetic ER stress, and so it is likely to be of broad importance in understanding how cells adapt.

Previous work had suggested that the upregulation of chaperones during ER stress is controlled by ATF6α [7], and so we predicted an important role for this protein in adaptation. To test this idea, we deleted ATF6α□□□□□□□□. We found that ATF6 α coregulates chaperone expression during ER stress, along with the IRE1α and PERK pathways. Because of this overlap, *Atf6*α-/- cells and animals tolerate brief exposure to stress, but not persistent insult[8]. These results suggest that ATF6α evolved at least in part to protect cells from chronic stress. These studies have laid the conceptual foundation for how the UPR is structured to allow for adaptation and have provided genetic tools to identify the mechanisms of adaptation. As an independent investigator, I will extend this work to the study of physiological and developmental stresses, with an emphasis on the mechanisms whereby professional secretory cells use an adaptive UPR to expand and maintain their secretory capacity.

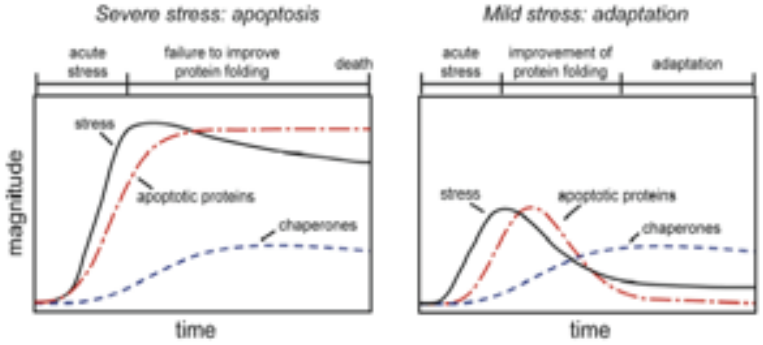


Figure 1. Improved protein processing is impossible when stress is severe (left panel). Thus, continued UPR signaling leads to prolonged upregulation of apoptotic proteins. During mild stress, upregulation of pro-adaptive proteins, such as ER chaperones, reduces the load on the ER folding machinery and attenuates further UPR signaling. The rapid degradation of pro-apoptotic proteins ensures that death pathways are not executed as cells adapt.

Future Work

To address the question of how cells adapt to chronic ER stress, my lab will pursue three areas of investigation over the next five years.

1. I hypothesize that the fundamental aspects of adaptation suggested by our earlier work will underlie adaptation to chronic ER stresses of different types, including genetic and developmental stresses. These aspects include: (a) quasi-permanent upregulation of adaptive UPR targets; (b) suppression of apoptotic cascades; and (c) net improvement in the ER protein processing capacity in adapted cells compared to naïve cells. This hypothesis is based on our preliminary data that suggest that various models of chronic ER stress lead to persistent upregulation of ER chaperones but not apoptotic cascades. These models include increases in ER protein load, genetic compromise of ER quality control, and differentiation of B-lymphocytes into antibody secreting plasma cells. Therefore, **my first specific aim will be to define the commonalities underlying the UPR as it induced by these stresses, to identify the consequences of these programs on ER function, and to describe the mechanisms by which these adjustments are maintained.** This work will take

advantage of our ability to reconstitute stresses of various types in experimentally tractable cell culture systems. In each of these systems, we will monitor the status of the UPR at multiple points, from its activation state to expression of downstream targets, at both RNA and protein levels. Using both endogenous and exogenous substrates, we will also monitor the ER protein folding and processing environment. This analysis will involve biochemical probing of ER chaperone-substrate interactions and the kinetics of protein maturation and secretion. In addition, in collaboration with Erik Snapp (Department of Anatomy and Structural Biology, Einstein University), we will use fluorescent substrates that require proper folding for their trafficking through the secretory pathway to monitor ER functionality in living cells. Finally, we will determine how the adapted state is maintained by comparing adapted cells to naïve cells. We will focus in particular on changes in gene and protein expression, and also on epigenetic modifications, that persist even when adapted cells are removed from stress. Together, these studies will reveal the underlying mechanisms by which the UPR allows for adaptation to stresses of various types.

2. I hypothesize that the ATF6α pathway is needed to establish and maintain the optimal functionality of professional secretory cells. This hypothesis is based in part on our preliminary data showing that secretory cell types in *Atf6*α-/- mice, including liver, pancreas and B-lymphocytes, show reduced expression of ER chaperones. Therefore, **my second specific aim will be to characterize the consequences of ATF6α deletion on the differentiation and functionality of professional secretory cells, using B-lymphocytes as my primary model system.** B-lymphocytes will be analyzed from wild-type and *Atf6*α-/- mice by both in vitro stimulation of differentiation into antibody-secreting plasma cells and by in vivo challenge with antigen. In addition to monitoring the antibody response in vitro and in vivo, we will determine whether the ER expansion that accompanies B-lymphocyte differentiation requires ATF6α, and whether *Atf6*α-/- B-lymphocytes are more prone to cell death during differentiation. The development of secretory cells as a model system for adaptation will provide a springboard for future work examining adaptation to other physiological and pathological stresses.

3. I hypothesize that continued signaling by an adaptive UPR maintains a functional secretory apparatus in fully differentiated professional secretory cells and therefore maintains organ physiology during both normal and stress conditions. This hypothesis is based in part on our observation that specific secretory tissues such as liver, pancreas, and spleen show suppressed expression of ER chaperones in *Atf6*α-/- mice in the absence of exogenous stress. **My third specific aim will be to elucidate the contribution of the UPR signaling pathways to the maintenance secretory organ function, with an emphasis on the liver.** This work will take advantage of my access to primary cell lines and mice genetically deficient in, or with readily deletable alleles of, many of the key UPR signaling molecules besides ATF6α, including ATF6β (a protein related to ATF6α of unknown function) and IRE1α. In mice, we will characterize liver function using biochemical and histological methods, and secretory pathway functionality by biochemical, proteomic, and genomic methods (for example, comparing the protein composition of the hepatic ER in normal animals or mice lacking ATF6α). Similar analysis will also be carried out in primary hepatocytes, wherein overexpression and knockdown experiments can be used to test specific predictions about the role of these proteins in maintaining liver function. Once the contributions of the ER signaling molecules to liver function is better understood, we will be able to explore how normal liver function is subverted by pathological challenges that lead to ER stress, such as chronic alcohol consumption, exposure to environmental toxins, and infection by hepatitis viruses.

The long-term aim of this work is to identify the key control points in cellular life-and-death decisions, and to find therapeutic means for manipulating these decisions to treat conditions in which dysregulation of the adaptive response has been implicated.

While the adaptive and apoptotic signaling pathways of the UPR have been in some cases well defined, this has occurred in largely non-overlapping studies that leave the question of how cells actually choose between these alternate fates undefined. Thus, this work is particularly timely, and fills an important but currently underrepresented area of study within the field of stress biology.

[1]Rutkowski et al. (2001) *PNAS* 98, 7823; [2]Rutkowski et al. (2003) *JBC* 278, 30365; [3]Hegde and Bernstein (2006) *TiBS* 31, 563; [4]Rutkowski and Kaufman (2007), *TiBS*, (in press); [5]Rutkowski et al. (2006) *PLoS Biol*. 4, e374; [6]Rutkowski et al. (2007) *MBoC* (in press); [7]Okada et al. (2002) *Biochem. J*. 366, 585; [8]Wu, Rutkowski, et al. (2007) *Dev. Cell* (in press)

C2. Example of original author's research proposal, which he would substantially change today.

CURRENT RESEARCH For the past four years, I have been investigating the broad questions of 1) How are endoplasmic reticulum (ER) activities and functions organized and coordinated? and 2) How does the ER form, differentiate, and maintain distinct subdomains? The ER performs essential cellular functions, including biogenesis of secretory proteins, calcium regulation, lipid synthesis, and the trafficking of proteins and lipids. Morphologically, the ER displays a variety of forms including branching tubules, cisternae, and closely apposed lamellar stacks. Furthermore, the ER is divided into ribosome-studded (rough ER-the site of translocation of lumenal and membrane proteins) and ribosome-free (smooth ER) subdomains. Despite the importance of ER functions, little is known as to how ER activities are organized in cells or how ER morphology is determined. As a postdoctoral fellow, I have initiated studies of these fundamental questions.

Analysis of data from the human genome project suggests that up to one fourth of all genes encode secretory and membrane proteins. Almost all such proteins are co-translationally inserted into the ER through a multicomponent protein channel, the translocon. The same channel has been implicated in the retrotranslocation of proteins out of the ER into the cytoplasm for degradation by the proteasome. While several proteins involved in forward translocation have been identified and characterized biochemically, little is known about how these proteins are organized within individual channels. Whether or how their organization changes with the functional state of the translocon (i.e. absence of nascent peptide chain, forward translocation of a peptide chain or retrotranslocation) are not clear.

To elucidate the mechanisms that organize translocons, I have begun developing tools to distinguish the different functional states of translocons. My initial studies have focused on characterizing actively translocating versus inactive translocons in cells. Using antibody-based acceptor photobleaching fluorescence resonance energy transfer (FRET) and confocal microscopy, protein-protein interactions between translocon components have been probed. Discrete changes in the organization of components of active and inactive translocons were detected[1].

To probe ER functionality and protein mobility, I have studied different forms of ER in a variety of organisms. I have used photobleaching (FRAP and FLIP)[2,3] of GFP-tagged proteins to help investigate retention of misfolded membrane proteins in mammalian ER[4] and protein trafficking between the ER and the Golgi in plants[5]. In collaboration with Dr. Mary Lilly, I identified the ER as the membranous component of the *Drosophila* ovary fusome, a cytoskeletal-membranous structure that connects cystocytes in the syncitial cyst that forms during oogenesis. Photobleaching experiments revealed the continuity of the ER between all of the cystocytes within a cyst and changes in continuity during oogenesis[6].

To study the biogenesis of smooth ER structures, I have integrated photobleaching and molecular biology techniques. These studies revealed that geometric structures including sinusoidal ER, crystalloid ER, karmellae, and whorls all can arise from the overexpression of specific resident ER membrane proteins with weakly interacting cytoplasmic domains that dimerize in an anti-parallel manner[7]. The dynamic interactions of these proteins bind ER membranes together, initially stacking on the nuclear envelope, and later reorganizing into Organized Smooth ER (OSER) structures. OSER may be pathogenic, as they are observed in cells expressing mutant proteins that cause Charcot-Marie-Tooth syndrome and early onset torsion dystonia. In collaboration with Dr. Gert Kreibich, I helped characterize a potential mechanism for the maintenance of rough ER organization. Photobleaching studies revealed that polysome assemblies of ribosomes and translocons diffuse extremely slowly, effectively immobilizing the large complexes and excluding them from other ER domains[8]. All of these projects have contributed to the development of a foundation for dissecting the mechanisms of ER organization and differentiation in my continuing studies.

FUTURE RESEARCH OBJECTIVES I will be building upon my postdoctoral studies to address the mechanisms of 1) translocon organization and function in cells and 2) ER differentiation.

1. Structural and spatial organization of the translocon- Using standard immunofluorescence techniques, translocon components display a homogeneous distribution throughout the ER. In contrast, FRET analysis of translocon components has revealed significant spatial heterogeneity in translocon organization throughout the ER, consistent with the possibility that spatial segregation of distinct translocon activities or functions exists. In addition, translocon activities are not restricted to forward translocation. The retrotranslocation of proteins out of the ER for ER associated degradation (ERAD) involves core translocon proteins. Whether translocons involved in forward translocation also participate in retrotranslocation is unknown.

To further investigate these ideas, FRET between translocon components will be used to correlate the spatial organization, composition, and distribution of translocons (and potentially other protein complexes) with their functional states and activities. Specialized cell types that may be enriched in distinct translocon activities will be probed. For example, antigen-presenting cells might have higher numbers of retrotranslocating translocons. FRET experiments will permit a direct visualization of the functional organization of the ER during normal development and disease states.

To knock down native translocon components and, in some cases, to functionally replace them with GFP-tagged wild type or mutated components, I have begun utilizing RNAi methods. Currently, stable RNAi cell lines are being generated for quantitative biochemical analyses of changes in protein processing in cells missing translocon components or containing functionally incorporated mutated components. In addition, these cells will be important for probing changes in translocon organization using the FRET methods I have developed as a postdoctoral fellow. Changes in translocon function will be qualitatively assessed by probing for changes in cell organization and the distributions of translocation-dependent proteins. Using these complementary approaches, exciting new insights into the cell biology of translocon function and organization will be gained.

2. Rough and smooth ER differentiation- The mechanisms that govern differentiation and partitioning of rough and smooth ER within a continuous organelle are poorly understood. To investigate the *regulation* and *components* of rough and smooth ER differentiation, pancreatic acinar cells (in which rough ER proliferates in response to glucocorticoid hormones) and lutein cells (in which smooth ER proliferates as estrogen levels fluctuate), will be used as model systems. Both cDNA microarray analysis and proteomics will be employed to identify candidate proteins involved in ER differentiation and to characterize their temporal regulation. Properties of candidate proteins will be investigated by expressing the proteins with fluorescent tags and imaging the proteins in undifferentiated cells and also by modulating expression of the native proteins in differentiated cells by using RNAi. How rough and smooth ER subdomains are *physically* formed and maintained is an equally important problem. Whether subdomains represent dynamic steady-state assemblies of proteins and membranes or whether subdomains form on scaffolds or matrices is unknown. Live cell imaging and photobleaching of rough and smooth ER marker proteins will be used to probe the accessibility and mobility of rough and smooth ER proteins within and between distinct ER subdomains. These approaches will yield valuable information about the molecular, spatial, and temporal regulation of ER differentiation.

SELECTED REFERENCES **1.Snapp** et al. (submitted). **2.Snapp** et al. Curr. Prot. Cell Biol. 2003. **3.**Lippincott-Schwartz et al. 2001. *Nat. Rev. Mol. Cell Biol.* 2:444-456. **4.**Nehls, et al. 2000. *Nat. Cell Biol.* 2:288-295. **5.**Brandizzi et al. 2002. *Plant Cell.* 14:1293-1309. **6.Snapp** et al. (in preparation). **7.Snapp** et al. 2003. *J Cell Biol.* 163:257-269. **8.**Nikonov et al. 2002 *J Cell Biol.* 158:497-506.

Claude Comments and Suggested Edits for author's 2003 Research Statement

Reviewed as: senior faculty, cell biology search committee

How to read this document. Part I reproduces your text verbatim in black. My comments are inserted inline in red bold brackets, numbered R1–R37, positioned at the sentence they address. Part II collects the structural argument, a jargon audit, and a list of experiments I would push back on. Where I suggest replacement wording, it appears in red under the comment.

PART I — ANNOTATED TEXT

CURRENT RESEARCH

For the past four years, I have been investigating the broad questions of 1) How are endoplasmic reticulum (ER) activities and functions organized and coordinated? and 2) How does the ER form, differentiate, and maintain distinct subdomains? **[R1 — These two questions are near-synonyms as written; both reduce to "how is the ER organized?" A committee reading eighty statements will retain neither. Replace with one declarative claim you intend to defend.]** The ER performs essential cellular functions, including biogenesis of secretory proteins, calcium regulation, lipid synthesis, and the trafficking of proteins and lipids. Morphologically, the ER displays a variety of forms including branching tubules, cisternae, and closely apposed lamellar stacks. Furthermore, the ER is divided into ribosome-studded (rough ER—the site of translocation of lumenal and membrane proteins) and ribosome-free (smooth ER) subdomains. Despite the importance of ER functions, little is known as to how ER activities are organized in cells or how ER morphology is determined. **[R2 — "Little is known" recurs below, joined by "poorly understood" once and "is unknown" three times. Ignorance-as-justification loses force with repetition. Keep one instance; convert the rest into the specific competing models that existing data cannot distinguish. Naming the models is what signals that you have thought about the problem.]** As a postdoctoral fellow, I have initiated studies of these fundamental questions. **[R3 — Soft landing, and a missed opportunity. Nowhere in these two pages do you distinguish your program from your postdoctoral advisor's. In a lab of that visibility this is the first question the committee will ask, and if the document does not answer it, the answer defaults to unfavorable. One explicit sentence — what you built, what you are taking with you, what you and your advisor have agreed the lab will not pursue — outweighs any single experiment described below.]**

Suggested opening (replacing R1): "Roughly one quarter of the human genome encodes proteins that must be threaded into the endoplasmic reticulum as they are made. I study how the machinery that performs this — and the organelle that houses it — is spatially organized, and I propose that ER architecture is set not by fixed scaffolds but by the weak, dynamic interactions of the resident proteins themselves."

Analysis of data from the human genome project suggests that up to one fourth of all genes encode secretory and membrane proteins. **[R4 — Your best line, buried in paragraph two. Move it to sentence one. It establishes stakes with a single number before any ER-specific vocabulary appears.]** Almost all such proteins are co-translationally inserted into the ER through a multicomponent protein channel, the translocon. **[R5 — JARGON. "Translocon" carries the entire proposal (~15 uses) but is defined only by this appositive. A chromatin or cytoskeleton colleague will lose the thread by page two. Spend a full clause: "a gated channel in the ER membrane through which nascent secretory proteins are threaded as they emerge from the ribosome."]** The same channel has been implicated in the retrotranslocation of proteins out of the ER into the cytoplasm for degradation by the proteasome. **[R6 — This one you define well. Do the same for ERAD below, which currently arrives as a bare acronym.]** While several proteins involved in forward translocation have been identified and characterized biochemically, little is known about how these proteins are organized within individual channels. Whether or how their organization changes with the functional state of the translocon (i.e. absence of nascent peptide chain, forward translocation of a peptide chain or retrotranslocation) are not clear. **[R7 — This is the sharpest question in the document and you have left it as a trailing subordinate clause. It is binary, falsifiable, and mechanistic: is the translocon one machine that switches modes, or are forward- and retro-translocating channels distinct populations? Promote it to the thesis of Aim 1 and design directly against it. Also: subject–verb disagreement ("Whether or how ... are not clear").]**

To elucidate the mechanisms that organize translocons, I have begun developing tools to distinguish the different functional states of translocons. My initial studies have focused on characterizing actively translocating versus inactive translocons in cells. Using antibody-based acceptor photobleaching fluorescence resonance energy transfer (FRET) and confocal microscopy, protein-protein interactions between translocon components have been probed. **[R8 — JARGON / METHOD. Most readers know FRET as a concept but not acceptor photobleaching, and "antibody-based" raises an objection you should pre-empt rather than wait for: an IgG adds roughly 10 nm of linker to a measurement whose whole dynamic range is roughly 10 nm. One clause on why the signal is interpretable. Any biophysically inclined reviewer stops here otherwise.]** Discrete changes in the organization of components of active and inactive translocons were detected **[R9 — This is the entire result of your headline finding, rendered in the**

passive voice with no direction, no magnitude, and no interpretation. Say which pair gained FRET, which lost it, by how much, and what that implies about the architecture of the channel. If one sentence in Current Research is going to be rewritten, make it this one.] 1.

To probe ER functionality and protein mobility, I have studied different forms of ER in a variety of organisms. I have used photobleaching (FRAP and FLIP) **[R10 — FRAP is universal; FLIP is not. Four words fix it: "FLIP, which reports whether two regions are continuous."]** 2,3 of GFP-tagged proteins to help investigate retention of misfolded membrane proteins in mammalian ER4 and protein trafficking between the ER and the Golgi in plants5. In collaboration with Dr. Mary Lilly, I identified the ER as the membranous component of the Drosophila ovary fusome, a cytoskeletal-membranous structure that connects cystocytes in the syncitial cyst that forms during oogenesis. **[R11 — JARGON CLUSTER, plus a typo. "Fusome," "cystocytes," and "syncytial cyst" arrive in a single sentence and will be opaque to everyone outside Drosophila development — likely most of the room. "Syncitial" should be "syncytial." Either add an orienting clause ("a membranous structure that keeps the cells of the developing egg chamber connected") or, given the space pressure, cut this to half a sentence. It is a lovely result, but it is tangential to both future aims, and a research statement is judged on focus.]** Photobleaching experiments revealed the continuity of the ER between all of the cystocytes within a cyst and changes in continuity during oogenesis6. **[R12 — Paragraph-level: this reads as a list of collaborations across four systems and demonstrates versatility at the cost of identity. Compress to two sentences organized around what these methods let you ask that others cannot, then move on.]**

To study the biogenesis of smooth ER structures, I have integrated photobleaching and molecular biology techniques. **[R13 — This paragraph runs past 250 words — a wall of text arriving exactly where a skimming reader decides whether to continue. Split it into three: the OSER mechanism, the disease connection, the ribosome-immobilization result.]** These studies revealed that geometric structures including sinusoidal ER, crystalloid ER, karmellae, and whorls all can arise from the overexpression of specific resident ER membrane proteins **[R14 — JARGON CLUSTER: four specialized morphology terms in nine words. Even ER people do not all know "karmellae." The reader does not need the taxonomy; they need the point — that structurally distinct, separately named ER morphologies all follow from one simple physical rule. Name one, cite the rest.]** with weakly interacting cytoplasmic domains that dimerize in an anti-parallel manner7. **[R15 — This is the mechanism, and it is the best thing in the document: a low-affinity, antiparallel interaction that zippers opposing membranes together. It currently gets eleven words. Give it two sentences and a schematic. One figure here would do more work than any paragraph on this page — and the statement has no figure at all, which is a missed opportunity in a**

document that is fundamentally about shape.] The dynamic interactions of these proteins bind ER membranes together, initially stacking on the nuclear envelope, and later reorganizing into Organized Smooth ER (OSER) structures. OSER may be pathogenic, as they are observed in cells expressing mutant proteins that cause Charcot-Marie-Tooth syndrome and early onset torsion dystonia. **[R16 — Two problems. (i) Logic: co-occurrence does not license "may be pathogenic," and a reviewer will mark it as overreach. Say what you can defend — these structures are induced by disease-causing mutants, which raises a testable question about whether membrane restructuring contributes to pathology. (ii) Strategy: you are applying to a medical school and this is your only disease sentence in 1,200 words. That is underplayed by an order of magnitude. Expand it into a short paragraph and let it motivate a specific experiment.]** In collaboration with Dr. Gert Kreibich, I helped characterize a potential mechanism for the maintenance of rough ER organization. **[R17 — "Helped characterize" tells a search committee you were a secondary contributor to someone else's question. If that is accurate, it belongs on the CV, not in a two-page document where space is your scarcest resource. If your contribution was larger, name it.]** Photobleaching studies revealed that polysome assemblies of ribosomes and translocons diffuse extremely slowly, effectively immobilizing the large complexes and excluding them from other ER domains8. All of these projects have contributed to the development of a foundation for dissecting the mechanisms of ER organization and differentiation in my continuing studies. **[R18 — Content-free transition. Cut it, or replace it with the actual through-line: these results converge on the claim that ER architecture is set by weak, dynamic protein interactions rather than a fixed scaffold — which is precisely the hypothesis your second aim tests. State that and the two halves of the document lock together.]**

FUTURE RESEARCH OBJECTIVES

I will be building upon my postdoctoral studies to address the mechanisms of 1) translocon organization and function in cells and 2) ER differentiation. **[R19 — Proportion: the document is roughly 60% past and 40% future. For an assistant professor search that ratio should be inverted, or at minimum equal — the committee is hiring the next five years, not the last four.]** **[R20 — Format the aims so they can be absorbed in ten seconds: a bolded aim title, one line stating the hypothesis, then the approach. At present each aim is a single dense paragraph and the actual hypothesis is buried mid-paragraph in both cases (see R22 and R33).]**

1. Structural and spatial organization of the translocon— Using standard immunofluorescence techniques, translocon components display a homogeneous distribution throughout the ER. In contrast, FRET analysis of translocon components has revealed significant spatial heterogeneity in translocon organization throughout the ER, **[R21 — Quantify "significant." Heterogeneity on what spatial scale, and by how**

much does it exceed the noise floor of the measurement? This is the single preliminary datum the entire aim rests on.] consistent with the possibility that spatial segregation of distinct translocon activities or functions exists. **[R22 — Triple-hedged: "consistent with" plus "the possibility that" plus "or." More substantively, heterogeneity in a FRET map has several mundane explanations — local protein density, labeling efficiency, membrane geometry and curvature, out-of-focus contribution — that must be excluded before it means functional segregation. Name them and say how you rule them out. A reviewer who thinks of these before you do will discount the aim.]** In addition, translocon activities are not restricted to forward translocation. The retrotranslocation of proteins out of the ER for ER associated degradation (ERAD) involves core translocon proteins. Whether translocons involved in forward translocation also participate in retrotranslocation is unknown. **[R23 — Your real hypothesis, again at the end of a paragraph. Lead with it. The aim then writes itself as a discriminating test: does a channel engaged in retrotranslocation retain the FRET signature of an actively translocating one, or convert to a distinct arrangement? Two outcomes, two different models of the machine. That is what a mechanistic aim looks like.]**

To further investigate these ideas, FRET between translocon components will be used to correlate the spatial organization, composition, and distribution of translocons **[R24 — MECHANISM PROBLEM. "Correlate" is the operative verb and correlation is the whole experiment. Even a flawless result yields an atlas of which arrangements accompany which activities; it cannot tell you whether the arrangement causes the activity, follows from it, or is incidental to it. Add a perturbation arm — impose a defined functional state (stall a nascent chain with a translation inhibitor, trap a substrate, block ERAD) and ask whether the FRET signature follows. That converts a description into a causal test, and it is the single change that would most improve this aim.]** (and potentially other protein complexes) **[R25 — Cut. A parenthetical widening of scope inside an aim tells a reviewer the aim is not bounded.]** with their functional states and activities. Specialized cell types that may be enriched in distinct translocon activities will be probed. For example, antigen-presenting cells might have higher numbers of retrotranslocating translocons. **[R26 — SURVEY, NOT MECHANISM. A speculative premise pursued by comparison across cell types, and it inherits every interpretive weakness in R22 at a larger scale: different cell types differ in ER density, expression level, and morphology, all of which move FRET independently of translocon state. Even if the correlation holds, you learn that a specialized cell has more of something — not how the machine works. Cut, or demote to one sentence of long-term direction rather than a described experiment.]** FRET experiments will permit a direct visualization of the functional organization of the ER during normal development and disease states. **[R27 — Overclaim. FRET reports proximity within roughly 10 nm between two labeled species; it does not "directly visualize functional organization." And "normal development and disease states" is**

a scope no two-page statement can support. Promise what the assay actually delivers — the credibility cost of overreach here is higher than the rhetorical gain.]

To knock down native translocon components and, in some cases, to functionally replace them with GFP-tagged wild type or mutated components, I have begun utilizing RNAi methods. Currently, stable RNAi cell lines are being generated for quantitative biochemical analyses of changes in protein processing in cells missing translocon components or containing functionally incorporated mutated components. **[R28 — Knockdown plus replacement with a tagged or mutant version is the right causal architecture and the strongest experimental logic in the proposal. But it is presented as ongoing methods development rather than as a test of anything. State the prediction: which component, which mutation, and what does the FRET map do if your model is right versus wrong? Note also that in 2003 a reviewer will want reassurance on knockdown efficiency and on whether the GFP-tagged replacement is functional — address both in a clause.]** In addition, these cells will be important for probing changes in translocon organization using the FRET methods I have developed as a postdoctoral fellow. Changes in translocon function will be qualitatively assessed by probing for changes in cell organization and the distributions of translocation-dependent proteins. **[R29 — Two flags. (i) "Qualitatively assessed" concedes the readout is not quantitative; a reviewer will immediately ask what effect size you could detect. (ii) The logic is circular against Aim 1 — there you infer function from organization, here you infer function from changes in organization. You need at least one functional readout independent of imaging: a pulse-chase translocation efficiency assay, protease protection, a degradation-rate measurement. Also "translocation-dependent proteins" is vague; name them.]** Using these complementary approaches, exciting new insights into the cell biology of translocon function and organization will be gained. **[R30 — Cut. Every applicant promises exciting insights, so the sentence carries no information, and it ends the aim on a soft note. End on the discriminating prediction instead.]**

2. Rough and smooth ER differentiation— The mechanisms that govern differentiation and partitioning of rough and smooth ER within a continuous organelle are poorly understood. **[R31 — Good framing: the paradox of stable subdomains within one continuous membrane is genuinely interesting and is the strongest hook in the future section. Lead the whole document with it if you like.]** To investigate the regulation and components of rough and smooth ER differentiation, pancreatic acinar cells (in which rough ER proliferates in response to glucocorticoid hormones) and lutein cells (in which smooth ER proliferates as estrogen levels fluctuate), will be used as model systems. **[R32 — Two notes. (i) JARGON: most cell biologists will not know that lutein cells are the steroidogenic cells of the corpus luteum. One clause. (ii) These are excellent system choices — hormonally inducible, near-pure expansion of one ER type, classically characterized — and you never say so. Claim the strength. But also address**

feasibility, because a committee will wonder: these are primary cells, presumably rodent, and the induction paradigms are decades old. Can you obtain them, transfect them, and image them live? An assay built in cultured cell lines does not obviously transfer.] Both cDNA microarray analysis and proteomics will be employed to identify candidate proteins involved in ER differentiation and to characterize their temporal regulation. **[R33 — THE LARGEST LIABILITY IN THE PROPOSAL. Two unbiased discovery screens run in parallel on primary tissue, with no hypothesis, no stated criteria for calling a hit, no validation pipeline, no estimate of how many candidates you expect, and no fallback if the answer is "four hundred transcripts changed." Hormonal induction of a secretory tissue will alter enormous numbers of genes for reasons unrelated to ER architecture, and nothing here separates drivers from consequences of differentiation. Reviewers read an unprioritized screen as a substitute for a hypothesis. It is doubly risky for a new lab: expensive in 2003 dollars, slow, and capable of consuming a startup and two years without producing a paper. RECOMMENDATION: cut it, or subordinate it — state a specific mechanistic hypothesis about what distinguishes rough from smooth ER, nominate three to five candidates a priori (ribosome receptors, translocon components, curvature-generating proteins, the antiparallel dimerizers from your own OSER work), test those, and mention the screen only as a later, separately funded extension.]** Properties of candidate proteins will be investigated by expressing the proteins with fluorescent tags and imaging the proteins in undifferentiated cells and also by modulating expression of the native proteins in differentiated cells by using RNAi. **[R34 — This inherits the screen's defect: "candidate proteins" are undefined, so no reader can judge whether the follow-up is feasible or interesting. Everything downstream of an undefined hit list is unevaluable. Name candidates and this becomes a real experiment.]** How rough and smooth ER subdomains are physically formed and maintained is an equally important problem. Whether subdomains represent dynamic steady-state assemblies of proteins and membranes or whether subdomains form on scaffolds or matrices is unknown. **[R35 — This is the best sentence in the future section, and it is on line twelve of a dense paragraph. It is a genuine either/or with distinguishable predictions; it connects directly to your own OSER and ribosome-immobilization results, both of which already favor the dynamic-assembly model; and it is testable with methods you already own. Make it Aim 2 in its entirety — or Aim 1. It is the mechanistic core of the document and it is currently a subordinate clause.]** Live cell imaging and photobleaching of rough and smooth ER marker proteins will be used to probe the accessibility and mobility of rough and smooth ER proteins within and between distinct ER subdomains. **[R36 — Three sentences for the strongest experiment in the proposal, against five for the screen. Invert that allocation. And state the discriminating predictions explicitly: a dynamic steady-state assembly predicts marker exchange across the subdomain boundary on a measurable timescale with recovery from the**

surrounding network; a scaffolded subdomain predicts a large immobile fraction and restricted exchange at the boundary. Say roughly what the recovery curves look like under each model. That is what persuades a reviewer you can actually tell them apart.] These approaches will yield valuable information about the molecular, spatial, and temporal regulation of ER differentiation. **[R37 — Content-free. Cut.]**

SELECTED REFERENCES

1. Snapp et al. (submitted). 2. Snapp et al. Curr. Prot. Cell Biol. 2003. 3. Lippincott-Schwartz et al. 2001. Nat. Rev. Mol. Cell Biol. 2:444-456. 4. Nehls, et al. 2000. Nat. Cell Biol. 2:288-295. 5. Brandizzi et al. 2002. Plant Cell. 14:1293-1309. 6. Snapp et al. (in preparation). 7. Snapp et al. 2003. J Cell Biol. 163:257-269. 8. Nikonov et al. 2002 J Cell Biol. 158:497-506. **[Both centerpiece findings — the FRET translocon result (ref 1) and the fusome work (ref 6) — are unpublished. That is normal at this career stage, but it must be managed rather than left bare. Name the journal and give a one-line status for the submitted manuscript. Otherwise a skeptical reviewer quietly discounts both, and they are carrying your Current Research section.]**

PART II — SUMMARY

1. The structural problem

You have written a competent account of what you have done and a vague account of what you will do. The document describes topics rather than defending a claim. Nothing in it states a hypothesis, and no experiment as written is designed to fail. A search committee reads for one thing above all: is there a question here that only this person is positioned to answer, and would I know the answer in five years?

The material for that document is already present. Three of your own results — antiparallel dimerization generating ordered ER, ribosome-translocon complexes immobilized by slow diffusion, and spatial heterogeneity in translocon FRET — converge on a single claim: ER subdomains are dynamic, self-organizing steady states produced by weak protein interactions, not compartments built on a scaffold. That claim is testable, it is currently unresolved, it distinguishes you from the imaging-methods identity of your postdoctoral lab, and your existing methods can discriminate the alternatives. Put it in the first paragraph and reorganize both aims beneath it.

- Invert the past:future ratio. Currently ~60:40; it should be at least 50:50, ideally 40:60.
- State the hypothesis in the first paragraph, and restate it as a one-line prediction under each aim.

- Address independence explicitly, in one sentence. It is the committee's first question and the document does not answer it.
- Add one schematic — the antiparallel-dimer model, or the two competing subdomain models with their predicted FRAP curves. A document about organelle shape with no figure is a wasted argument.
- Add a short paragraph of disease relevance. You are applying to a medical school and you have one disease sentence in 1,200 words, despite holding ERAD, Charcot-Marie-Tooth, torsion dystonia, and secretory tissue biology in hand.

2. Jargon audit

Terms below will stop a PhD-level reader who does not work on the ER. That describes most of the department you are applying to, and quite possibly most of the committee.

Term	Location	Problem and fix
translocon	throughout (~15×)	Carries the whole proposal; defined only by an appositive. Give it one full working sentence at first use.
retrotranslocation / ERAD	¶2, Aim 1	Retrotranslocation is defined well; ERAD then arrives as a bare acronym. Define once, use the acronym after.
acceptor photobleaching FRET	¶3	The concept of FRET is general knowledge; this implementation is not. One clause on what is bleached and what that reports.
FLIP	¶4	FRAP is universal, FLIP is not. Add: "which reports whether two regions are continuous."
fusome / cystocytes / syncytial cyst	¶4	Three Drosophila development terms in one sentence, opaque to most readers. Also "syncitial" is misspelled. Orient in one clause, or cut the example.
karmellae / crystalloid ER / sinusoidal ER / whorls	¶5	Four specialist morphology terms in nine words. Even ER researchers do not all know karmellae. Name one, cite the rest.
OSER	¶5	Acronym is fine once defined, but it is defined mid-sentence inside the longest paragraph in the document.
anti-parallel dimerization	¶5	This is your mechanism. Do not compress it into two words — describe the zippering geometry in a sentence.
lutein cells	Aim 2	Most cell biologists will not connect this to the corpus luteum. One clause.

Term	Location	Problem and fix
translocation-dependent proteins	Aim 1	Vague to everyone, including specialists. Name the actual reporters.
lamellar stacks, cisternae, polysome	¶1, ¶5	Acceptable at PhD level. No change needed.

3. Experiments that do not get at mechanism

Ordered by how much they cost you with a committee.

Element	Why it is a liability, and what to do
Microarray + proteomics screen of hormone-induced ER expansion (Aim 2)	Two unbiased screens in parallel, no hypothesis, no hit criteria, no validation plan, no fallback. Hormone induction of secretory tissue changes vast numbers of genes for reasons unrelated to ER architecture; you cannot separate drivers from consequences. Expensive and slow for a new lab, and capable of eating a startup without yielding a paper. Cut, or demote to a funded extension after a hypothesis-driven first pass on nominated candidates.
Survey of specialized cell types for enriched translocon activities (Aim 1)	Speculative premise, correlative design, and confounded by exactly the variables that move FRET independently of translocon state — ER density, expression level, membrane geometry. A positive result yields a catalogue, not a mechanism. Cut or demote to one sentence.
"Correlate spatial organization with functional state" (Aim 1)	Correlation is the entire experiment. Add perturbation: impose a defined functional state and ask whether the FRET signature follows. This single change converts the aim from descriptive to causal.
"Qualitatively assess" function via cell organization (Aim 1)	Not quantitative, and circular against the rest of Aim 1 — organization is used to infer function while function is used to interpret organization. Requires one imaging-independent functional readout.
Follow-up on undefined "candidate proteins" (Aim 2)	Unevaluable as written, because it depends entirely on the output of the screen above. Naming candidates a priori fixes both problems at once.

Element	Why it is a liability, and what to do
Characterizing ER forms across organisms (Current Research ¶4)	Fine as evidence of range in the past-work section, but it reads as a collaboration list. Compress; it dilutes your identity at the point where the reader is forming it.

4. Prose, clarity, and flow

- Passive voice. The Future Research section is almost entirely agentless — "will be used" (4×), "will be probed," "will be employed," "will be investigated," "will be assessed," "will be generated," "will be gained," "will yield." I count roughly twenty. The effect is that no one appears to be doing the work. Convert to first person: "I will test whether…" This is the highest-yield line edit in the document.
- Empty summary sentences. Three paragraphs end on filler: "contributed to the development of a foundation," "exciting new insights will be gained," "will yield valuable information." Delete all three, or replace each with the specific prediction. Paragraph endings are load-bearing positions and you are spending them on nothing.
- Repetitive ignorance framing. "Little is known" ×2, "poorly understood" ×1, "is unknown" ×3, "are not clear" ×1. Seven declarations that a field is unstudied begin to read as a substitute for a plan. Keep one; convert the rest into competing models.
- Hedge stacking. "Consistent with the possibility that … or …" and "may be enriched … might have higher numbers." Hedge once, then commit. Compound hedging reads as an author who does not believe the result.
- Paragraph length. The fourth Current Research paragraph exceeds 250 words and both future aims are single blocks. Break them; use a bolded lead-in for each aim so the structure survives skimming.
- Buried leads, systematically. Four times, the most interesting sentence in a paragraph is its last: the genome statistic (R4), the forward-versus-retro question (R7 and R23), and the dynamic-versus-scaffold question (R35). This is your most consistent structural habit. Move the claim to the front of the paragraph and use the remaining sentences to support it.
- Typo: "syncitial" → "syncytial." Subject–verb: "Whether or how their organization changes … are not clear" → "is not clear." Reference callouts run into the preceding word ("detected1", "plants5") — check spacing and superscript formatting in the final version.

5. What is missing

- A hypothesis, stated as such.
- Any statement of scientific independence from your postdoctoral advisor.
- A figure.
- Feasibility and resources — what instrumentation the program needs, and what you already have working. A committee weighing a confocal-dependent program will want to know.
- Any acknowledgment of alternative interpretations or of what happens when an experiment fails. Every experiment here is described as though it will work.
- Developed disease relevance, in an application to a medical school.

6. Bottom line

The science is real and the methods are genuinely differentiating — few people in 2003 can do quantitative live-cell photobleaching and FRET on the ER at this level, and that is a defensible niche. What the statement lacks is an argument. It reads as a list of things that could be measured rather than a claim someone is trying to establish.

Two changes would do most of the work. First, promote the dynamic-steady-state versus scaffold question (R35) to the thesis of the document and organize both aims as tests of it. Second, cut the microarray-and-proteomics screen (R33) and replace it with a small set of a priori candidates drawn from your own published work. The first gives the document a spine; the second removes the element most likely to make a reviewer conclude you do not yet have a hypothesis. Everything else here is line editing.

C3. Research Proposal Example 3

Generously provided by Dr. Anne Kenworthy

Research accomplishments and current research

Structure of lipid raft microdomains— In the so-called "lipid raft" model, glycosphingolipids and cholesterol are proposed to self-assemble into microdomains which organize other proteins and lipids. These domains form functional complexes that can participate in a variety of membrane trafficking and cell signaling events [1]. Lipid rafts have been principally characterized biochemically by their insolubility in cold non-ionic detergent. Despite the wide-ranging implications of this model, the structure of lipid rafts in cell membranes is controversial. To visualize these domains in intact cells, I used a novel form of fluorescence microscopy with extremely high resolution (<100 Å), imaging fluorescence resonance energy transfer (FRET). My FRET measurements suggested that glycosylphosphatidylinositol (GPI)-anchored proteins, a biochemical marker for lipid raft domains, are not present in clusters as predicted by the lipid raft model but instead appear to be randomly distributed across the cell surface [2, 3]. This implies that either rafts are small and dynamic structures, or the entire outer leaflet of the plasma membrane is a single raft-like domain. How raft domains organize lipid-modified proteins on the inner leaflet of the plasma membrane remains an open question, which I plan to return to in future experiments.

Intracellular trafficking of Ras—Ras GTPases are key players in signal transduction pathways regulating cell growth and differentiation. Ras, a farnesylated protein, has long been known to localize to, and function at, the inner leaflet of the plasma membrane. It is now known that palmitoylated N- and H-Ras isoforms are also associated with the Golgi complex, and reach the cell surface as part of the classical secretory pathway [4]. The presence on N- and H-Ras on the Golgi could have additional implications for Ras trafficking and signaling. In collaboration with Dr. Mark Philips (New York University), I have addressed this issue using time lapse confocal microscopy and photobleaching techniques in living cells expressing Green Fluorescent Protein (GFP) chimeras of N-, H- and K-Ras. My studies have revealed a previously unidentified pathway that recycles N- and H-Ras from the cell surface to the Golgi complex. Preliminary experiments indicate that this pathway may be utilized by other cytoplasmic lipid-modified proteins and therefore could provide a general mechanism for regulating the trafficking and signaling of these molecules, possibilities I propose to explore in future experiments.

Membrane dynamics of lipid raft components at the cell surface—My previous FRET experiments suggested that most GPI-anchored proteins are not constitutively clustered in raft domains. The dynamics of the association of these molecules and other proteins with lipid rafts remains an open question. Recent high-resolution measurements of the dynamics of individual proteins in plasma membranes imply that molecules remain stably associated with lipid rafts for minutes [5]. To test this, I am measuring the diffusional mobility of GFP-tagged raft and non-raft markers, including both transmembrane and peripheral lipid-modified proteins, using confocal FRAP. I have also begun to use confocal fluorescence correlation microscopy (FCS), another technique that can resolve the diffusion of individual molecules from that of lipid raft domains, as a complementary approach to this question. Our FRAP data suggest that only a small fraction of molecules is associated with these microdomains at any given time. Since the lateral diffusion of cytoplasmic lipid-modified proteins has been largely unexplored, these experiments also provide fundamental insight into the environment of the inner leaflet of the plasma membrane.

Future research plans

Lipid-modified proteins localized at the inner leaflet of the plasma membrane play key roles in relaying signals from cell surface receptors to intracellular effectors [6]. This family of peripheral membrane

proteins includes Ras, heterotrimeric G-proteins and Src family kinases, proteins intimately linked to cancer biology. A goal of my future research is to understand how the lipid modifications of these proteins (myristoylation, palmitoylation, and prenylation) impact their function. My initial studies will address the following specific questions using live-cell confocal microscopy of GFP-tagged proteins [7] coupled with FRET, FRAP, and FCS techniques [8-10]:

1. Intracellular trafficking of lipid-modified signaling proteins— While some lipid-modified proteins such as K-Ras are almost exclusively localized to the plasma membrane, others such as nitric oxide synthase, Gα subunits, and palmitoylated forms of Ras (N- and H-Ras) are also associated with the Golgi complex. I will explore the role of this Golgi pool in the intracellular trafficking of these molecules by asking:

A. Do multiple lipid-modified proteins share a common cycling pathway between the plasma membrane and the Golgi complex?— I will test whether the cycling pathway utilized by N- and H-Ras is a common pathway shared by other lipid-modified proteins, visualize the intermediates involved in this process, and characterize the signals that sort proteins into this pathway.

*B. How are lipid-modified proteins trafficked to and from the cell surface in polarized cells?—*I will determine which proteins undergo vesicular transport from the Golgi complex to the cell surface in polarized epithelial cells, evaluate whether trafficking occurs directly or by transcytosis, and determine if sorting signals target these proteins to either the apical or basolateral membranes.

2. Molecular associations of lipid-modified proteins in signaling complexes— Current models suggest that these peripheral proteins are not randomly distributed across the inner leaflet of the plasma membrane but instead are organized in complexes that could serve to compartmentalize and regulate cell signaling events. To test this I will ask:

A. How are lipid-modified proteins organized on the inner leaflet of the plasma membrane? I will test if lipid raft domains [1] organize lipid-modified proteins in pre-assembled complexes and/or if such domains assemble transiently during cell signaling. How the size, composition, and dynamics of these complexes change over time will also be characterized. I will also evaluate the effects raft-disrupting conditions such as cholesterol depletion and raft-enhancing conditions such as antibody-induced crosslinking.

B. Does caveolin regulate signaling by organizing lipid-modified proteins into complexes? *I will probe for direct binding of various proteins to caveolin, a transmembrane protein thought to act as a "scaffold" for regulating signaling [11]. I will also look for indirect effects of caveolin arising from its cholesterol-binding activity [12].*

***References**: [1] Simons and Ikonen (1997)* Nature ***387**:569; [2] Kenworthy and Edidin (1998)* J. Cell Biol. ***142**:69; [3] Kenworthy* et al. *(2000)* Mol. Biol. Cell ***11**:1645; [4] Choy et al. (1999)* Cell ***98**:69; [5] Pralle* et al. *(2000)* J. Cell Biol. ***148**:997; [6] Casey (1995)* Science ***268**:221; [7] Lippincott-Schwartz* et al. *(1998)* Trends Cell Biol. ***8**:16; [8] Pollok and Heim (1999)* Trends Cell Biol. ***9**:57; [9] Nehls* et al. *(2000)* Nat. Cell Biol. ***2**:288; [10] Brock* et al. *(1999)* Proc. Natl. Acad. Sci. USA ***96**:10123; [11] Okamoto* et al. *(1998)* J. Biol. Chem. ***273**:5419; [12] Roy* et al. *(1999)* Nat. Cell Biol. ***1**:98.*

D1. Example of Cover Letter
Generously provided by Dr. D. Thomas Rutkowski

Date

Name
Department
Institution
Address
City, State, Zip

Dear Committee Members:

I am a postdoctoral fellow in the lab of Dr. xxx at the University of Michigan. I am applying for the position of Assistant Professor in the Department of Cell Biology and Neuroscience at Rutgers, the State University of New Jersey. This application is in response to an advertisement in the September 7 issue of Science.

My postdoctoral work has been devoted to understanding the mechanisms by which cells adapt to chronic stress in the endoplasmic reticulum. The endoplasmic reticulum stress response is necessary for protection against a wide spectrum of chronic diseases and also for the proper development of secretory tissues. Ultimately, if we are to understand the normal development of secretory cells, and to therapeutically intervene when stress-mediated cell death is implicated, we must understand how cells commit to adaptation over death.

My work to date has led to important fundamental insights into the mechanisms of adaptation. As a principal investigator, I will extend this work to understanding how cells sense and adapt to physiological and developmental endoplasmic reticulum stress. My expertise in cell biology and molecular biology, signal transduction, development, and genetics, and active collaborations in other areas, give me a broad experimental base. I am confident that I will maintain a vigorous and internationally competitive research program that will complement the existing strengths of the Department of Cell Biology and Neuroscience.

Letters of reference in support of this application will be provided by:

- x, Ph.D., postdoctoral advisor, Howard Hughes Medical Institute / University of Michigan
- x, M.D., Ph.D., graduate advisor, University of California San Francisco/ Prosetta Corporation
- x, M.D., Ph.D., collaborator, National Institute of Child Health and Human Development / National Institutes of Health
- x, Ph.D., collaborator, University of Texas Southwestern Medical Center

I can be contacted at (555) 555-5555 (work): (555) 555-5555 (cell); or xxx@gmail.com (email)

I look forward to hearing from the committee.

Sincerely,

D2. Example of Author's Cover Letter

DEPARTMENT OF HEALTH & HUMAN SERVICES

Erik Lee Snapp, Ph.D.
National Institutes of Health

National Institutes of Child Health
And Human Development
Cell Biology and Metabolism Branch
Building 18T, Room 101
Bethesda, MD 20892
Phone: 301-496-5189
Fax: 301-402-0078

March 11, 2004

Search Chair
UCSF Box X
San Francisco, CA

Dear Dr. X,

I wish to apply for the tenure-track faculty position of Assistant Professor in cell/developmental biology advertised on Science Jobs online. Attached are a copy of my curriculum vitae, recent reprints, and statements of research and teaching interests.

A fundamental issue in cell biology is to understand the molecular mechanisms governing the biogenesis and functional organization of cellular organelles. I have concentrated my efforts on the endoplasmic reticulum (ER). My postdoctoral research in the laboratory of Dr. Jennifer Lippincott-Schwartz at the National Institutes of Health has focused on using live cell fluorescence imaging and biophysical techniques including photobleaching and FRET to visualize the organization and dynamics of ER proteins and membranes. In the future, I plan to expand my studies of ER biogenesis in three areas: structural organization of the ER protein translocation channel in cells, characterization of the spatial distribution of functional activities of protein complexes in cells, and the mechanisms and regulation underlying the proliferation of rough and smooth ER in differentiated cells. In addition to imaging and biophysical techniques, my future studies will incorporate additional tools including RNAi, gene replacement, and proteomics. These studies will provide fundamental and novel insights into 1) the cell biology of the ER protein translocation channel and 2) the functional organization and architecture of the ER.

I am committed to pursuing a career in academia and research, and look forward to hearing from you regarding my application. If you wish to discuss my educational and research background in further detail, please contact me at (301)-496-5189. Thank you for your consideration of my application.

Sincerely,

Erik Lee Snapp, Ph.D.

D3. Cover Letter Example 3
Generously provided by Dr. Anne Kenworthy

X, Ph.D.
address
city, state zip

November 24, 2000 **Cell Biology**

School of XXX
University of XXX
address
street address
city, state zip code

Dear Search Committee,

Enclosed please find my application for one of the tenure-track faculty positions in the area of Cell Biology in the School of X recently advertised in *Science* Online. My research interests are the intracellular trafficking, molecular associations and membrane dynamics of lipid-modified proteins. In my postdoctoral research with Dr. X at X University, I studied the organization of GPI-anchored proteins in lipid raft microdomains using fluorescence resonance energy transfer (FRET) microscopy. My current postdoctoral research in the laboratory of Dr. X at the National Institutes of Health has focused on visualizing the intracellular trafficking and membrane dynamics of Ras. My studies of Ras-GFP chimeras have revealed a pathway by which Ras cycles between the cell surface to the Golgi complex. This pathway could represent a general mechanism for regulating the trafficking and signaling of cytoplasmic lipid-modified proteins.

In the future, I plan to expand my studies of Ras to investigate how lipid modifications such as prenylation, palmitoylation, and myristoylation regulate the function of lipid-modified signaling proteins localized to the inner leaflet of the plasma membrane. My initial studies will focus on the intracellular trafficking of GFP chimeras of a variety of these proteins between the cell surface and Golgi complex as well as the association of these proteins with lipid raft domains to form signaling complexes. I will study these processes in living cells using cutting-edge confocal imaging methods and biophysical techniques such as FRET, fluorescence recovery after photobleaching (FRAP), and fluorescence correlation spectroscopy (FCS). These studies will provide fundamental insights into the links between the cell biology and signal transduction of these proteins.

Thank you for your consideration of my application.

Sincerely,
applicant signature
applicant, Ph.D.

E1. Author's Teaching Philosophy example 1. I still like this document.

TEACHING INTERESTS

My greatest teaching challenge has been to convey my love of science and ideas to a broad audience of varied backgrounds. Whether tutoring an Adult Basic Education course, speaking to fourth grade students on career day at NIH or teaching graduate students how to photobleach cells with a confocal microscope, I have always sought to engage all of the students. My favorite response from a student came from a fifth grade girl when I visited her school as part of the NERDS science outreach program. I organized and taught a parasite focused microbiology workstation. Afterwards, the girl said to me, "Thanks to you, I'm never traveling anywhere or eating anything again!" It was the best compliment I've received for my teaching.

To succeed in biology, I think students must be taught how to learn. I started in biology in the late 1980's before PCR, green fluorescent protein, gene chips or bioinformatics had been discovered or created. Today, biologists take advantage of all of these tools and must be prepared for tomorrow's tools, such as proteomics or RNAi. To this end, I would convey to students that science is a dynamic process and not a set of static facts to be memorized. I believe this can be accomplished by integrating a combination of science history, modern day research problems, and an appreciation of cutting-edge techniques with standard course topics. Lecture materials would be supplemented with problem sets and hands-on laboratory experience, whenever possible.

Learning extends well beyond the classroom. My work in laboratories during my undergraduate education was an essential aspect of my training as a scientist. Providing students with such an opportunity is a critical factor in the education process at this level. Both laboratory-based courses and programs that enable interested students to participate in mentored research can provide such opportunities. At the graduate level, helping students to become scientists by working with them on a daily basis is one of the most critical roles of the faculty. I benefited from having a graduate advisor that still worked at the bench and was able to address both questions about the direction of a research project and the intricate details of a troublesome experiment. Mentoring from other professors helped broaden my perspective of approaches to scientific questions and career paths. Finally, I think it is important to prepare postdoctoral fellows for their future careers. Career development workshops on topics such as grant proposal writing and alternative careers have been popular at my graduate institute and at my postdoctoral institution. I would be interested in developing and participating in such a program as a faculty member.

My teaching experience includes serving as a microbiology teaching assistant for medical students and as an instructor for an advanced microscopy course for graduate students, postdoctoral fellows, and professors. As a teaching assistant, I set up the labs, lectured on the methods, provided technical guidance, and led class discussions of problem sets. For the microscopy course, I wrote an extensive handout (that became the basis of my Current Protocols chapter), lectured, and instructed students in hands-on use of the confocal microscope and the interpretation of experimental results. In both cases, I was teaching students from broad backgrounds and with varied interests. It was a challenge that I enjoyed and look forward to in the future.

Based on my background, I would be able to teach in either undergraduate or graduate-level cell biology or parasitology courses. I could also teach a specialized course such as

organelle biogenesis or microbial pathogenesis at the graduate level. In addition, I could contribute selected lectures on light microscopy, fluorescence microscopy methods, protein translocation, and glucose transporters.

E2. Teaching philosophy example 2

Generously provided by Dr. D. Thomas Rutkowski

Before I knew that I wanted to be a scientist, I knew that I wanted to teach. When I was first exposed to the career arc of the academic research scientist, I realized that I could do both. I view teaching at all levels as an opportunity to present science as a dynamic process of discovery, and to introduce the scientific way of thinking to students and trainees.

As a graduate student, I co-authored a chapter with my advisor on protein targeting in the textbook *Cells*, which is the new cell biology companion to the *Genes* series. In composing that work, I made a conscious effort to emphasize throughout the chapter the topics that are important but poorly understood. The feedback I have received on this effort suggests that this approach has been well received by both students and teachers. I remember from my own time as a student that biology presented as a series of facts, with little supporting information on how problems were addressed and what remained to be discovered, was dull. While a more contextual presentation of science is routine (or at least should be) in graduate school, I believe it can be successfully applied to undergraduates and to non-scientist postgraduates. I also believe that such classes would benefit from the presentation of topics under a unifying theme that runs throughout a teaching period. For example, essentially all of cell biology can be taught around the biology of HIV, which can be used to integrate lectures on DNA replication, transcription, translation, protein folding and transport, cell cycle control, immunity, etc. In classes with a relatively small number of students, this approach can be further augmented by incorporation into a problem-based learning format. The goal of these approaches is to not only make science more interesting, but also to illustrate how science is ultimately detective work and discovery.

The research scientist also has a responsibility to teach through mentoring of lab personnel. I benefited at all levels of my research training—even as an undergraduate—from advisors who gave me a great deal of leeway. I was free to pursue questions that I found interesting and to learn from my own success and failures. In my mentoring of undergraduate and graduate students, I have applied a similar approach. My philosophy has been to give trainees projects on which they could have some ownership, rather than using them as technicians. I have found that even the undergraduates who come to the lab seeking to bolster a C.V. for medical school applications are more likely to develop their critical thinking faculties in this way. For graduate students in particular, I will tend to err on the side of independence rather than regimented oversight. Early intellectual freedom, even thought it might be more frustrating for trainees in the short term (as it was for me), will better prepare them for scientific independence.

With that consideration in mind, though, I recognize the importance of striking the proper balance between a hands-off approach and more direct supervision. I have come to appreciate first-hand that every person comes to a lab with a unique motivation and a unique set of strengths and weaknesses. I believe that mentoring young scientists should always encompass critical data interpretation (especially of one's own data), development of experimental plans, scientific writing, presentation, and career development. However, these lessons cannot all fit into a "one-size-fits-all" style of mentoring. Some students will thrive with independence, but others will flounder. My goal as a mentor is to be flexible to each person's motivations and talents, to maximize his or her potential.

My formal teaching assistantship experiences encompassed giving brief lectures, assisting in labs, conducting question and answer sessions, holding office hours, and individual meetings as necessary. Thus, in addition to fundamentally enjoying teaching, I have enough experience to feel

comfortable with it. Based on my specific background and expertise, I would be most qualified to teach undergraduate or graduate level cell biology courses, or specialized topics courses in the secretory pathway, stress responses, or protein biogenesis. I could also contribute lectures on protein translocation, ER quality control, or secretory cell development.

E3. Teaching Philosophy Example 3
generously provided by Dr. Anne Kenworthy

Teaching philosophy and interests

I approach science education from the perspective of someone who attended a small liberal arts college as an undergraduate and research-oriented universities as a graduate student and postdoctoral fellow. Being able to actively participate in laboratory research was an important aspect of my undergraduate training, and I think that providing students with such an opportunity is a key aspect of the education process at this level. Both laboratory-based courses as well as programs that enable interested students to participate in supervised research can provide such opportunities. At the graduate level, helping graduate students to become scientists by working with them on a day-by-day basis is clearly one of the most critical roles of the faculty. But, I also think an important challenge in science education today is to recognize the needs of the growing number of students and postdoctoral fellows who will not continue to work in a traditional academic settings but instead will pursue "non-traditional" scientific careers. While I do not necessarily believe that the current format of Ph.D. programs should be changed, I do think this is issue needs to be given serious consideration by those training the next generation of scientists.

My current philosophy of teaching is based on my experience as the instructor of a semester-long course on "Biomembrane Structure" in the Masters program in Biotechnology at The Johns Hopkins University. The program was a part-time one, most of the students having day jobs as technicians and taking one or two courses per week at night. I was singularly responsible for the course, and the syllabus and format of the class were entirely of my design. Since the course was in a biotechnology program, I discussed both the biophysical and biochemical properties of lipids and model membrane systems and selected topics in the cell biology of membranes. In retrospect, I probably had overly ambitious expectations of the students: I assigned weekly problem sets based on readings from the primary literature, in addition to background reading from several textbooks. In class each week, I devoted two hours to a lecture based on the material from the textbook and one hour to discussions of the assigned papers and problem sets. There were also two exams, and a student project consisting of a research paper and a presentation based on the paper. In the students' evaluations of the course, several commented on the fact that although they had to work extremely hard, they got a lot out of it. Given that I was a full-time postdoctoral fellow at the time, I felt much the same way.

In the future, in addition to teaching a specialized course such as biological membranes at the graduate level, based on my background I would also be able to teach in either an undergraduate or graduate-level cell biology course. My experience in fluorescence techniques and biophysical chemistry would enable me to contribute selected lectures in courses in these areas as well.

F. Examples of an application update

Dear Search Committee,

I am writing to update you on my activities since I submitted my application. On January 10, my manuscript Snapp EL, other authors. Title. was accepted at the Journal of Cell Biology. In addition, I gave an invited 20 minute presentation at the American Society of Cell Biology Annual Meeting on Dec. 9. I continue to be highly enthusiastic about the position in your department and look forward to hearing from you. Thank you for your time.

sincerely,

Erik Lee Snapp

Dear Search Committee,

I am writing to update you on my activities since I submitted my application. Importantly, I received a letter of offer from the Department of Biology at Big Name School on February 1. While I am interested in the Big Name School position, your institution is my top choice. I share a number of research interests with several of your faculty and would like the opportunity to be considered for your department. I have been asked to make a decision for Big Name School by March 1. I would welcome the opportunity to discuss my status with you. Thank you for your time and I look forward to hearing from you.

sincerely,

Erik Lee Snapp

G. Example of typical start-up costs for a cell biology lab in 2004 (really outdated numbers)

Date	Item	Supplier	Cat. No.	Price	Qty	Total Price
10/12/04	2005 at a glance calendar	staples	558433	$9.15	1	$9.15
10/12/04	acme keen earth scissors	staples	711770	$6.69	2	$13.38
10/12/04	acco 350 paper punch	staples	893844	$42.89	1	$42.89
10/12/04	scotch deluxe tape dispenser	staples	463940	$13.99	2	$27.98
10/12/04	office star chair	staples	500281	$79.99	1	$79.99
10/12/04	tensor brushed steel lamp	staples	382362	$29.99	1	$29.99
10/12/04	staple remover	staples	211862	$0.65	1	$0.65
10/12/04	imac	applestore		$2,001.00	1	$2,001.00
10/12/04	HP 2300N bw laser printer	applestore		$949.00	1	$949.00
10/22/04	stir bar kit	fisher sci	14-513-82	$47.38	1	$47.38
10/22/04	red spirit thermometers	fisher sci	14-983-19b	$20.93	2	$41.86
10/22/04	portable pipete aid 110v	fisher sci	13-681-19	$183.11	1	$183.11
10/22/04	combitip 10ml	fisher sci	21-381-340	$87.36	1	$87.36
10/22/04	combitip 2.5 ml	fisher sci	21-381-338	$87.36	1	$87.36
10/22/04	pipet eppendorf repeater plus	fisher sci	21-380-338	$331.50	1	$331.50
10/22/04	stirrer scholar pc-171	fisher sci	11-497-22	$109.20	1	$109.20
10/22/04	vortex genie mixer 120 v	fisher sci	12-812	$207.00	1	$207.00
10/22/04	Ub-5 ph meter	fisher sci	02-226-211	$339.70	1	$339.70
10/22/04	buffer pack ph standards	fisher sci	sb105	$19.58	1	$19.58
10/22/04	hydrion double roll ph paper	fisher sci	14-850-11b	$3.70	1	$3.70
10/22/04	microcentrifuge tube rack 5/pack	fisher sci	05-541-4	$26.13	1	$26.13
10/22/04	scoopula	fisher sci	14-357	$10.96	1	$10.96
10/22/04	micro spatula tapered 12/pk	fisher sci	21-401-10	$31.44	1	$31.44
10/22/04	syringe gas tight 50ul	fisher sci	14-824-30	$30.37	2	$60.74
10/22/04	carboy w/spigot 9l	fisher sci	02-963-5A	$83.27	3	$249.81
10/22/04	hooded gas lighter	fisher sci	12-007	$1.95	2	$3.90
10/22/04	renewal flints 5/pk	fisher sci	12-007-5	$2.72	1	$2.72
10/22/04	burner natural gas model	fisher sci	03-902	$51.94	1	$51.94
10/22/04	burner for natural gas	fisher sci	03-917	$21.92	1	$21.92
10/22/04	wash bottle 500 ml 4 pk	fisher sci	03-409-10E	$15.13	1	$15.13
10/22/04	ice bucket w/lid purple	fisher sci	11-675-120	$51.16	2	$102.32
10/22/04	incubator co2 tc sensor 115 v	fisher sci	11-689-4	$3,337.00	1	$3,337.00
10/22/04	biological safety cabinet 4 ft	fisher sci	11-686 8	$5,374.00	1	$5,374.00
10/22/04	cabinet stand napflow 1200	fisher sci	11 686-71	$290.00	1	$290.00
10/22/04	sash panel uv napflow 1200	fisher sci	11-686-11	$549.00	1	$549.00
10/22/04	variable speed tile rocker	fisher sci	05-450-34	$423.42	1	$423.42
10/22/04	polaroid gelcam kit w/ 7" hood	fisher sci	04-441-122	$1,661.37	1	$1,661.37
10/22/04	8"x8" variable intensity	fisher sci	11-992-80	$1,385.31	1	$1,385.31

	spectroline UV transilluminator						
10/26/04	mettler 150GX 0.1g balance	fisher sci		1913460	$568.00	1	$568.00
10/26/04	label pal label printer	fisher sci		11877175	$249.00	1	$249.00
10/26/04	printer labels	fisher sci		11877178	$18.15	3	$54.45
10/26/04	bath isotemp	fisher sci		1546210	$956.86	2	$1,913.72
10/26/04	eppendorf centrifuge	fisher sci		540061	$6,424.00	1	$6,424.00
10/26/04	rotor swing bucket	fisher sci		540064	$1,320.00	1	$1,320.00
10/26/04	adapter 50 ml tubes	fisher sci		540073	$169.60	2	$339.20
10/26/04	adapter 15 ml	fisher sci		540070	$169.60	1	$169.60
10/26/04	mp3 cell/mtb module/pp basic	biorad	165-3323		$908.10	2	$1,816.20
10/26/04	minisub cell GT system w/7x10 caster	biorad	170-4467		$231.20	2	$462.40
10/29/04	Gilson PR1000 pipetman	Rainin	PR1000		$256.00	1	$256.00
10/26/04	Gilson p10	tte laboratories	gp10		$109.00	2	$218.00
10/26/04	Gilson p100	tte laboratories	gp100		$109.00	2	$218.00
10/26/04	Gilson p200	tte laboratories	gp200		$109.00	1	$109.00
10/26/04	Mycycler thermocycler	Biorad			$4,245.75	1	$4,245.75
10/29/04	Mirra chair	Tobron			$640.00	1	$640.00
11/2/04	1 ml pipettes	fisher sci	07-200-571		$92.34	1	$92.34
11/2/04	2 ml pipettes	fisher sci	07-200-572		$107.11	1	$107.11
11/2/04	5 ml pipettes	fisher sci	07-200-573		$30.21	1	$30.21
11/2/04	10 ml pipettes	fisher sci	07-200-574		$32.55	1	$32.55
11/2/04	25 ml pipettes	fisher sci	07-200-575		$87.17	1	$87.17
11/2/04	200 ul pipette tips sterile	fisher sci	07-200-583		$19.00	3	$57.00
11/2/04	1000 ul pipette tips sterile	fisher sci	07-200-304		$23.59	3	$70.77
11/2/04	0.65 ml eppendorf tubes	fisher sci	07-200-186		$27.85	1	$27.85
11/2/04	1.7 ml eppendorf tubes	fisher sci	07-200-535		$106.10	1	$106.10
11/2/04	50 ml centrifuge tubes	fisher sci	05-526B		$98.84	2	$197.68
11/2/04	15 ml centrifuge tubes	fisher sci	05-538-59A		$75.58	2	$151.16
11/2/04	14 ml pp snapcap tubes	fisher sci	14-956-1J		$63.60	1	$63.60
11/2/04	forceps, jewlers	fisher sci	08-953E		$23.60	2	$47.20
11/2/04	bench liner	fisher sci	14-127-47		$79.46	1	$79.46
11/2/04	tripod, iron 8"	fisher sci	15-300C		$25.51	1	$25.51
11/2/04	pan, stainless 10x6x1/2x2	fisher sci	13-361A		$27.13	1	$27.13
11/2/04	marking pen black 10/pk	fisher sci	13-379-1		$25.33	1	$25.33
11/2/04	tube vaccum 1/4" ID, 10ft		14-176-6b		$42.85	0	$0.00
11/19/04	multi-stage CO2 regulator	fisher sci	10-572E		$281.00	1	$281.00
11/19/04	microvolume pipette tips 0.5-10 ul	fisher sci	07-200-251		$28.53	2	$57.06
11/19/04	plate 6 well	fisher sci	07-200-83		$44.13	1	$44.13
11/19/04	plate 12 well	fisher sci	07-200-82		$48.92	1	$48.92
11/19/04	24 well tc clstr sterile	fisher sci	09-761-146		$48.39	1	$48.39
11/19/04	96 well plates	fisher sci	07-200-89		$57.17	1	$57.17
11/19/04	flask 25 cm2 canted next 500/cs	fisher sci	10-126-30		$201.50	1	$201.50

11/19/04	filter system 150 ml 0.22um	fisher sci	09-761-118		$43.39	1	$43.39
11/19/04	vl round bottom org cap 2ml 250 cs	fisher sci	09-200-198		$65.19	2	$130.38
11/19/04	beaker starter kit Kimax	fisher sci	02-555-2		$17.15	2	$34.30
11/19/04	HD utility funnel 12/pk	fisher sci	10-500-7		$23.10	1	$23.10
11/19/04	1000 ml erlenmeyer flasks 6/pk	fisher sci	10-040K		$34.80	1	$34.80
11/19/04	250 ml erlenmeyer flasks 12/pk	fisher sci	10-040F		$34.80	1	$34.80
11/19/04	cylinder grad 2000 ml	fisher sci	08-572-10H		$25.86	2	$51.72
11/19/04	100ml pmp cyl grad 1ml	fisher sci	08-572-10D		$9.02	5	$45.10
11/19/04	beaker pp grad 500 ml	fisher sci	02-591-33		$12.07	2	$24.14
11/19/04	beaker pp prtd grad 500 ml 10/pk	fisher sci	02-591-30		$33.62	1	$33.62
11/19/04	bottle media grad 500 ml	fisher sci	06-404D		$4.63	10	$46.30
11/19/04	bottle media grad 125 ml	fisher sci	06-404A		$2.35	20	$47.00
11/19/04	bottle 1000 ml non grad 24/cs	fisher sci	06-451-279		$150.89	1	$150.89
11/19/04	parafilm 4"x250 ft	fisher sci	13-374-12		$30.93	1	$30.93
11/19/04	weighboat large 500/cs	fisher sci	02-204C		$99.86	1	$99.86
11/19/04	weighboat medium 500/cs	fisher sci	02-204B		$50.50	1	$50.50
11/19/04	weighboat small 500/pk	fisher sci	02-204A		$41.46	1	$41.46
11/19/04	weigh paper 4x4 inches	fisher sci	09-898-12B		$14.22	1	$14.22
11/19/04	tris/glycine/sds 10X 1l	fisher sci	bp1341-1		$36.66	1	$36.66
11/19/04	brilliant blue r-250 coomassie	fisher sci	bp101-50		$70.55	1	$70.55
11/19/04	EDTA 0.5 DEPC treated 1 l	fisher sci	bp24831		$54.19	1	$54.19
11/19/04	glycerol 1l	fisher sci	bp2291-1		$49.20	1	$49.20
11/19/04	hepes 1M 500 ml	fisher sci	bp299500		$90.12	1	$90.12
11/19/04	tween20 500 ml	fisher sci	bp337-500		$15.04	1	$15.04
11/19/04	triton x-100	fisher sci	bp151-500		$21.31	1	$21.31
11/19/04	axiovert200 microscope	zeiss			$19,827.10	1	$19,827.10
11/18/04	epson perfection photoscanner 4870		t9297ll/A		$391.43	1	$391.43
11/17/04	whirlpool 21 cu ft refrigerator	pc richard	et-1mhkxmq		$444.00	1	$444.00
11/17/04	fridigaire upright freezer 21 cu ft	pc richard	ffu2124dw		$365.00	1	$365.00
11/17/04	frigidaire refrigerator 18.2 cu ft.	pc richard	frt18b4aw		$349.00	1	$349.00
12/3/04	PFUultra high fidelity DNA polymerase	Stratagene		600380	$107.91	1	$107.91
12/3/04	Qiafilter plasmid midi kit(25)	Qiagen		12243	$224.00	2	$448.00
12/3/04	Qiaquick PCR purification kit(50)	Qiagen		28104	$79.00	2	$158.00
12/3/04	Qiaquick gel extraction kit(50)	Qiagen		28704	$79.00	2	$158.00
12/3/04	alkaline phosphatase	fisher sci	PRM1821		$41.80	1	$41.80
12/3/04	DNA markers,1kb DNA ladder	fisher sci	bp2578-100		$80.50	2	$161.00
12/3/04	PCR nucleotide mix(40MM)	fisher sci	bp25651		$166.10	1	$166.10
12/3/04	wizard plus DNA miniprep	fisher sci	PRA7510		$266.20	1	$266.20
12/3/04	DTT	fisher sci	bp172-5		$36.85	1	$36.85

12/3/04	glycine	fisher sci	bp381-500	$27.90	1	$27.90
12/3/04	tris base	fisher sci	bp152-1	$55.77	1	$55.77
12/3/04	vac man lab vacuum manifold	fisher sci	PR-A7231	$108.00	1	$108.00
12/3/04	potassium acetate 500G	fisher sci	bp364-500	$20.07	1	$20.07
12/3/04	SDS 100G	fisher sci	bp166-100	$25.63	1	$25.63
12/3/04	tris-glycine 10x,4L	fisher sci	bp13064	$53.78	1	$53.78
12/3/04	hydrochloric acid reag ACS 500ML	fisher sci	A144-500	$12.94	1	$12.94
12/3/04	sodium hydroxide cert ACS 500G	fisher sci	S318-500	$17.54	1	$17.54
12/3/04	DMSO 100ML	fisher sci	bp231-100	$14.59	2	$29.18
12/3/04	formaldehyde 37% 500ML	fisher sci	bp531-500	$17.52	1	$17.52
12/3/04	PBS 10x 2x1L/pk	fisher sci	bp665-1	$24.47	5	$122.35
12/3/04	LB broth Miller 500G	fisher sci	bp1426-500	$27.81	1	$27.81
12/3/04	kanamycin mono sulphate 5G	fisher sci	bp906-5	$32.19	1	$32.19
12/3/04	ampicillin Na salt 25G	fisher sci	bp1760-25	$41.97	1	$41.97
12/3/04	funnel Buchner PP/PA 110MM	fisher sci	10-362E	$15.68	2	$31.36
12/3/04	filter paper WH3 11cm 100/pk	fisher sci	09-820B	$12.48	1	$12.48
12/3/04	flask filtering PP 3/8" 2L	fisher sci	10-182-51	$20.37	2	$40.74
12/3/04	rub stpr 1 hole#10 8/pk	fisher sci	14-135P	$22.16	1	$22.16
12/3/04	methanol cert ACS 4L poly	fisher sci	A412P-4	$24.59	2	$49.18
12/10/04	timer portable keychain w/alarm	fisher sci	06-662-25	$13.61	1	$13.61
12/10/04	autoclv tape strat-ln 3/4" 60 yd	fisher sci	11-889-11	$4.01	3	$12.03
12/10/04	flask filtering PP 3/8" 2L	fisher sci	10-182-51	$20.37	3	$61.11
12/10/04	flask filtering pp 1000ML 1/CS	fisher sci	10-182-50B	$16.57	3	$49.71
12/10/04	rub stpr 1 hole#8 appx 12/pk	fisher sci	14-135M	$21.52	1	$21.52
12/13/04	natural powder free latex gloves w.aloe,S	fisher sci	19-050-548A	$5.95	1	$5.95
12/13/04	natural powder free latex gloves w.aloe,M	fisher sci	19-050-548B	$5.95	1	$5.95
12/13/04	natural powder free latex gloves w.aloe,L	fisher sci	19-050-548C	$5.95	1	$5.95
12/13/04	natural powder free latex gloves w.aloe,XL	fisher sci	19-050-548D	$5.95	1	$5.95
12/15/04	LB lubert agar Miller	fisher sci	bp1425-500	$61.14	1	$61.14
12/15/04	Culture dish 100x20mm	fisher sci	08-772-32	$80.00	2	$160.00
12/16/04	Kit 1st aid 16 unit	fisher sci	17-987-97B	$46.77	1	$46.77
12/16/04	Compact first aid kit	fisher sci	19-027-409	$6.53	1	$6.53
12/16/04	Astrospec patriot CL XTREM	fisher sci	19-025-334	$6.59	3	$19.77
12/16/04	Compak storage cabinet	fisher sci	17-153A	$369.93	1	$369.93
12/16/04	4 gal acid cabinet	fisher sci	19-033-718	$406.89	1	$406.89
12/16/04	Respirator main free BBI	fisher sci	18-999-3262	$15.52	2	$31.04
12/16/04	Carboy WM w/handle LDPE 20L	fisher sci	02-961-60E	$42.56	2	$85.12
12/16/04	Jar w/m PP 32oz	fisher sci	11-815-10F	$25.90	1	$25.90
12/21/04	Ethanol 200 proof 1gal	stores		$7.50	1	$7.50

12/21/04	Ammonium persulfate 100g	fisher sci	bp179-100		$18.49	1	$18.49
12/21/04	Tricine 100g	fisher sci	bp315-100		$31.18	4	$124.72
12/21/04	Tris hydrochloride 1kg	fisher sci	bp153-1		$106.89	1	$106.89
12/21/04	10x TAE (Tris-acetate-EDTA) 4l	fisher sci	bp13354		$53.15	1	$53.15
12/21/04	glacial acetic acid seq 500ml	fisher sci	bp1185-500		$20.44	2	$40.88
12/21/04	ethidium bromide 5g	fisher sci	bp102-5		$70.55	1	$70.55
12/21/04	syringe filter 26mm,0.2,50/case	fisher sci	09-754-29		$42.54	1	$42.54
12/21/04	syringe 10ml,LL,100/pk	fisher sci	14-817-31		$27.19	1	$27.19
12/21/04	sodium azide,50g	Sigma	71289-50G		$41.61	1	$41.61
12/21/04	TEMED, 50ml	Biorad	161-0801		$35.89	1	$35.89
12/21/04	40%Acryl/Bis sol,29:1,500ml	Biorad	161-0146		$49.47	1	$49.47
12/21/04	30%Acryl/Bis sol,37.5:1,500ml	Biorad	161-0158		$42.68	1	$42.68
12/21/04	E-quote E005404649-dimension 2400 series				$458.10	1	$458.10
12/22/04	Tris base 1kg	fisher sci	bp152-1		$55.62	1	$55.62
12/22/04	PBS 10x solution	fisher sci	bp3991		$30.33	1	$30.33
1/4/05	polyfect transfection reagent	Qiagen		1015530	$19.00	1	$19.00
1/4/05	electrode pH glass	fisher sci	02-226-3		$79.79	1	$79.79
1/4/05	autoclave gloves orange	fisher sci	11-394-299		$15.96	1	$15.96
1/5/05	pipes free acid biotechnology	Sigma	P1851-25G		$30.33	1	$30.33
1/5/05	calcium chloride dihydrate sigmaultra	Sigma	C5080-500G		$34.28	1	$34.28
1/5/05	potassium chloride ACS reagent	Sigma	P3911-500G		$23.13	1	$23.13
1/5/05	manganese chloride tetrahydrate USP	Sigma	M8054-100G		$24.81	1	$24.81
1/5/05	magnesium sulfate heptahydrate molecular	Sigma	M2773-500G		$32.94	1	$32.94
1/5/05	cylinder carbon dioxide 65#	tech-air	CD-65		$18.74	2	$37.48
1/11/05	incubator 1.0cuft	fisher sci	11-695-1		$285.76	1	$285.76
1/11/05	agarose 1ooG	fisher sci	bp1356-100		$144.50	1	$144.50
1/11/05	four-wy MCRTB	fisher sci	03-448-17		$25.10	1	$25.10
1/11/05	gasinlet filter for CO2 incubator	fisher sci	11-688-82		$14.99	1	$14.99
1/11/05	kimwipes	fisher sci	06-666A		$95.79	1	$95.79
1/11/05	NPT female pipe adapter	fisher sci	NC9239338		$11.00	1	$11.00
1/13/05	END Note 7 Mac	CDW Government inc		513943	$179.19	1	$179.19
1/13/05	1 kb DNA ladder	stores	bp-2578-100		$80.50	1	$80.50
1/14/05	Adobe acrobat pro 7 CD Windows	gov connection		5558775	$22.83	1	$22.83
1/14/05	Adobe acrobat pro 7 licence Windows	gov connection		5555849	$45.65	1	$45.65
1/14/05	Adobe acrobat pro 7 CD Mac	gov connection		5558791	$22.83	1	$22.83
1/14/05	Adobe acrobat pro 7 licence Mac	gov connection		5559268	$45.65	1	$45.65
1/14/05	Adobe photoshop CS CD Windows	gov connection		469872	$22.83	1	$22.83
1/14/05	Adobe photoshop CS licence Windows	gov connection		5412549	$126.41	1	$126.41
1/14/05	Adobe illustrator CS CD Mac	gov connection		469851	$22.83	1	$22.83

1/14/05	Adobe illustrator Cs licence Mac	gov connection		5207158	$42.14	1	$42.14
1/20/05	Protein standards kaleidoscope prestained	Biorad	161-0324		$100.00	1	$100.00
1/20/05	goat anti-mouse rabbit igg hrp	Jackson immunoresearch	115-035-146		$105.00	1	$105.00
1/20/05	goat anti-rabbit IgG hrp	Jackson immunoresearch	11-035-144		$105.00	1	$105.00
1/20/05	filtr sheet 10 ft	fisher sci	HAH00010		$193.20	1	$193.20
1/20/05	isopropanol HPLC	fisher sci	bp26324		$48.88	1	$48.88
1/20/05	supersignal west pico 100 ml	fisher sci	PI34077		$61.75	1	$61.75
1/20/05	autorad cassette 8x10"	fisher sci	FB-XC-810		$87.81	1	$87.81
1/20/05	Ponceau S 10g	fisher sci	bp103-10		$19.07	1	$19.07
1/20/05	Fuji RX film 8x10" 100/pk	fisher sci	04-441-115		$108.10	1	$108.10
1/20/05	pan HDPE 10 QT	fisher sci	13-359-25		$17.38	1	$17.38
1/21/05	Microsoft office pro 2003 CD	Dell	A0169281		$19.38	1	$19.38
1/21/05	Microsoft office pro 2003 licence	Dell	A0154983		$47.20	1	$47.20
1/24/05	test tube support full view	fisher sci	14-781-15		$9.46	2	$18.92
1/24/05	microcentrifuge tube rack pick 5/pack	fisher sci	05-541-5		$27.43	2	$54.86
1/24/05	sodium acetate	fisher sci	bp333-500		$29.69	1	$29.69
2/1/05	MP3 comb,15 well,0.75mm	Biorad		1653355	$21.56	6	$129.36
2/4/05	restriction enzyme BamHI	fisher sci	prr6021		$29.41	1	$29.41
2/4/05	restriction enzyme Bgl II	fisher sci	prr6081		$26.90	1	$26.90
2/4/05	restriction enzyme Eco RI	fisher sci	prr6011				$0.00
2/4/05	restriction enzyme Kpn I	fisher sci	prr6341		$44.44	1	$44.44
2/4/05	restriction enzyme Not I	fisher sci	prr6431		$42.00	1	$42.00
2/4/05	restriction enzyme Xho I	fisher sci	prr6161		$29.40	1	$29.40
2/4/05	alkaline phosphatase	fisher sci	prm1821		$41.80	1	$41.80
2/4/05	T4 DNA ligase	fisher sci	prm1801		$27.73	1	$27.73
2/4/05	pen-strep	biosurce int	P303-100		$9.00	2	$18.00
2/4/05	glutamine 100x	biosurce int	p300-100		$9.00	2	$18.00
2/4/05	trypsin-versene 1x	biosurce int	p301-100		$5.60	5	$28.00
2/4/05	RPM1 16 without phenol red&glutamine	biosurce int	p149-500		$13.05	2	$26.10
2/4/05	DMEM high glucose	biosurce int	p104-500		$8.20	5	$41.00
2/4/05	DMEM without cysteine methine	biosurce int	p158-500		$18.90	2	$37.80
2/8/05	ASE I	Biolab	R0526S		$46.40	1	$46.40
2/8/05	box microscope slide 100P red	fisher sci	03-448-3		$11.53	4	$46.12
2/8/05	slide frostd 1 sde 3x1"	fisher sci	12-518-103		$24.27	2	$48.54
2/8/05	CVR glas CIR 12mm grwth	fisher sci	12-545-82		$56.93	1	$56.93
2/8/05	coverglass, labteck,8well	fisher sci	12-565-470		$551.49	1	$551.49
2/22/05	gloves latx aloe sm	fisher sci	19-050-548A		$5.95	3	$17.85
2/22/05	stacking pans with ventilation	fisher sci	15-239-17		$25.67	1	$25.67
2/22/05	tyg tub1/4x3	fisher sci	14-169-3C		$13.89	1	$13.89
2/22/05	uffilt mlx-FG50	fisher sci	SLFG05010		$74.76	1	$74.76

2/22/05	carboyw/handle CPE 25L	fisher sci	02-961B		$56.65	1	$56.65
2/24/05	oxyblot oxidation detection kit	chemicon intl. inc	S7150		$250.00	1	$250.00
2/24/05	affi-gel protein A, 5ml	Bio Rad		1536153	$173.63	1	$173.63
2/25/05	NaCl	stores					$0.00
3/2/05	prepaid rental on high pressure	tech-air	HP-rental		$3.60	2	$7.20
3/2/05	prepaid rental on high pressure cylinders	tech-air	HP-lease		$3.60	22	$79.20
3/2/05	minitrans-blot filter paper	BioRad		1703932	$33.95	4	$135.80
3/2/05	Fisher hand tally counter	fisher sci	07-905-6		$25.12	1	$25.12
3/2/05	counting chamber	fisher sci	02-671-5		$117.51	1	$117.51
3/2/05	strpet 2ml PA/PLAS	fisher sci	07-200-572		$107.11	1	$107.11
3/2/05	autorad cassette 8x10"	fisher sci	FB-XC-810		$87.81	2	$175.62
3/8/05	DPN I	New England Biolab	R0176S		$46.40	1	$46.40
3/8/05	Hind III	New England Biolab	R0104L		$169.60	1	$169.60
3/8/05	Pst I	New England Biolab	R0140S		$46.40	1	$46.40
3/8/05	EcoRI	New England Biolab	R0101S		$42.40	1	$42.40
3/8/05	Mlu I	New England Biolab	R0198S		$46.40	1	$46.40
3/8/05	Afl II	New England Biolab	R0520S		$42.40	1	$42.40
3/8/05	Nhe I	New England Biolab	R0131S		$46.40	1	$46.40
3/8/05	Sal I	New England Biolab	R0138S		$42	1	$42.40
3/8/05	Spe I	New England Biolab	R0133S		$46.40	1	$46.40
3/10/05	monoclonal anti-a-tubulin clone B-5-1-2	Sigma	T5168-.2ml		$199.36	1	$199.36
3/29/05	alcohol 200proof 1gal	stores			$7.50	2	$15.00
3/29/05	inhibitors,complete-EDTA free	stores			$117.78	1	$117.78
3/29/05	MCT rainbow,0.65ml	fisher sci	07-200-186		$27.85	1	$27.85
3/29/05	sucrose	fisher sci	bp220-212		$46.84	1	$46.84
4/4/05	sigmaclean water bath treatment	Sigma	S5525-4oz		$34.35	1	$34.35
4/7/05	Blue Ultra Autorad film	ISC BioExpress	F-9029-8x10		$119.00	2	$238.00
4/14/05	stripette 10 ml pap/plast 200/case	fisher sci	07-200-574		$32.55	1	$32.55
4/14/05	stripette 5ml pap/plast 200/case	fisher sci	07-200-573		$30.21	1	$30.21
4/15/05	adventurer pro 53gx0.001G	fisher sci	01-921-17		$496.00	1	$496.00
4/18/05	Fungizone 20ml, plastic, Gibco	invitrogen		15290018	$12.16	1	$12.16
4/18/05	PSN antibiotic mix 100ml,pla	invitrogen		15640055	$16.26	1	$16.26
4/18/05	lipofectamine 2000 0.75ml	invitrogen		11668027	$161.15	1	$161.15
4/21/05	supersignal west pico 100 ml	fisher sci	PI34077		$61.75	1	$61.75
4/27/05	Protein standards kaleidoscope prestained	BioRad	161-0324		$100	1	$100.00
5/5/05	tip blue 100-1000uL RK ST M/CS	fisher sci	07-200-304		$24.06	1	$24.06
5/5/05	mcrvolume-G str, 0.1-10uL 960/cs	fisher sci	07-200-521		$29.10	1	$29.10
5/5/05	tris-glycine 10x sol 4L	fisher sci	bp13064		$60.67	1	$60.67

5/5/05	methanol cert ACS 4L poly	fisher sci	A412P-4		$26.57	1	$26.57
5/10/05	anti-calreticulin	affinity bioreagent	PA3-900		$245.00	1	$245.00
5/25/05	Not I	New England Biolab	RO189L		$201.60	1	$201.60
5/25/05	Bgl II	New England Biolab	RO144S		$42.40	1	$42.40
5/25/05	T4 DNA ligase	New England Biolab	MO202S		$50.40	1	$50.40
6/1/05	PBS10x 2x1L	fisher sci	bp665-1		$26.96	5	$134.80
6/1/05	supersignal west pico 100 ml	fisher sci	PI34077		$61.75	1	$61.75
6/1/05	mcrvolume-G str, 0.1-10uL 960/cs	fisher sci	07-200-521		$29.10	2	$58.20
6/1/05	methanol cert ACS 4L poly	fisher sci	A412P-4		$26.57	2	$53.14
6/1/05	big digit alarm timer 4-chanel	fisher sci	14-649-17		$20.81	1	$20.81
6/1/05	minitrans-blot filter paper	BioRad		1703932	$33.95	3	$101.85
Jun-05	Alexa fluor R 488 0.5ml	invitrogen	A11008		$122.00	1	$122.00
Jun-05	Alexa fluor R 546 0.5ml	invitrogen	A11010		$122.00	1	$122.00
Jun-05	Alexa fluor R 633 0.5ml	invitrogen	A21070		$122.00	1	$122.00
Jun-05	annexin V,Alexa fl 500ul	invitrogen	A13202		$344.00	1	$344.00
Jun-05	Hoechst 33342, TRIH 10ml	invitrogen	H3570		$64.00	1	$64.00
Jun-05	brefeldin A from penicil 5mg	invitrogen	B7450		$60.00	1	$60.00
7/1/05	Mediatech Trypsin/EDTA	fisher sci	MT25052CI		$4.72	1	$4.72
7/1/05	Mediatech DMEM w/L-glutamine	fisher sci	MT10013CV		$3.56	1	$3.56
7/11/05	80K-H antibody	BD bioscience		610481	$395.00	1	$395.00
7/12/05	syringe gas tight 50ul	fisher sci	14-824-30		$31.34	2	$62.68
7/12/05	1.7ml graduated microcentrifuge natural,500/pk	ISC BioExpress	C3269-1		$10.00	5	$50.00
7/12/05	4-way flipper racks small natural	ISC BioExpress	R-4932-1		$8.25	5	$41.25
7/12/05	80-place rack,natural,5/pk	ISC BioExpress	R4910-1		$24.00	2	$48.00
7/12/05	0.65ml graduated microcentrifuge tubes,rainbow	ISC BioExpress	C3268-2		$16.00	2	$32.00
7/15/05	eppendorf microcentrifuge 5415D with free rotor and tubes	fisher sci	05-401-15		$1,475.00	1	$1,475.00
7/25/05	blue tips bulk	fisher sci			$11.00	5	$55.00
7/25/05	tris/glycine/SDS 10x 1L	fisher sci	bp1341-1		$36.66	1	$36.66
8/12/05	1kb DNA ladder	fisher sci	bp2578-100		$80.50	2	$161.00
8/22/05	supersignal west pico 100 ml	fisher sci	PI34077		$61.75	1	$61.75
8/22/05	SDS 100g	fisher sci	bp166-100		$26.14	1	$26.14
8/22/05	Tricine 100g	fisher sci	bp315-100		$35.88	1	$35.88
8/22/05	glv klngrd s	fisher sci	19-120-3052B		$14.66	3	$43.98
8/22/05	glv klngrd L	fisher sci	19-120-3052D		$14.66	1	$14.66
9/14/05	AgeI restriction enzyme	New England Biolab	RO552S		$46.40	1	$46.40
9/14/05	T4 DNA ligase	New England Biolab	MO202S		$50.40	1	$50.40
9/28/05	wizard plus DNA miniprep	fisher sci	PRA7510		$279.40	1	$279.40
						total	$78,758.85

Obviously, prices will need to be adjusted for inflation and type of lab. Note that this is only lab supplies and equipment. Personnel, publications, travel, and use of core facilities are not part of the listed costs.

H. Checklist before attending interview

Talk Materials
- laptop
- laptop power cord and video adapter (especially if you use Mac laptops)
- 10' extension cord for your laptop

cloud drive or emailed backup containing: job talk
- PDFs of publications and preprints
- additional slides, posters from postdoc work
- CV, teaching statement, research proposal

Hard copies
- reprints of all publications
- copy of CV, teaching statement, research proposal
- printed copies of slides or poster materials
- webpage printouts of faculty you will be meeting (to review)

Copy of latest Interview Schedule (though this many change)
Contact phone numbers of your hosts and the department administrator
Flight/train itineraries
Hotel and School/Institute information including addresses and maps

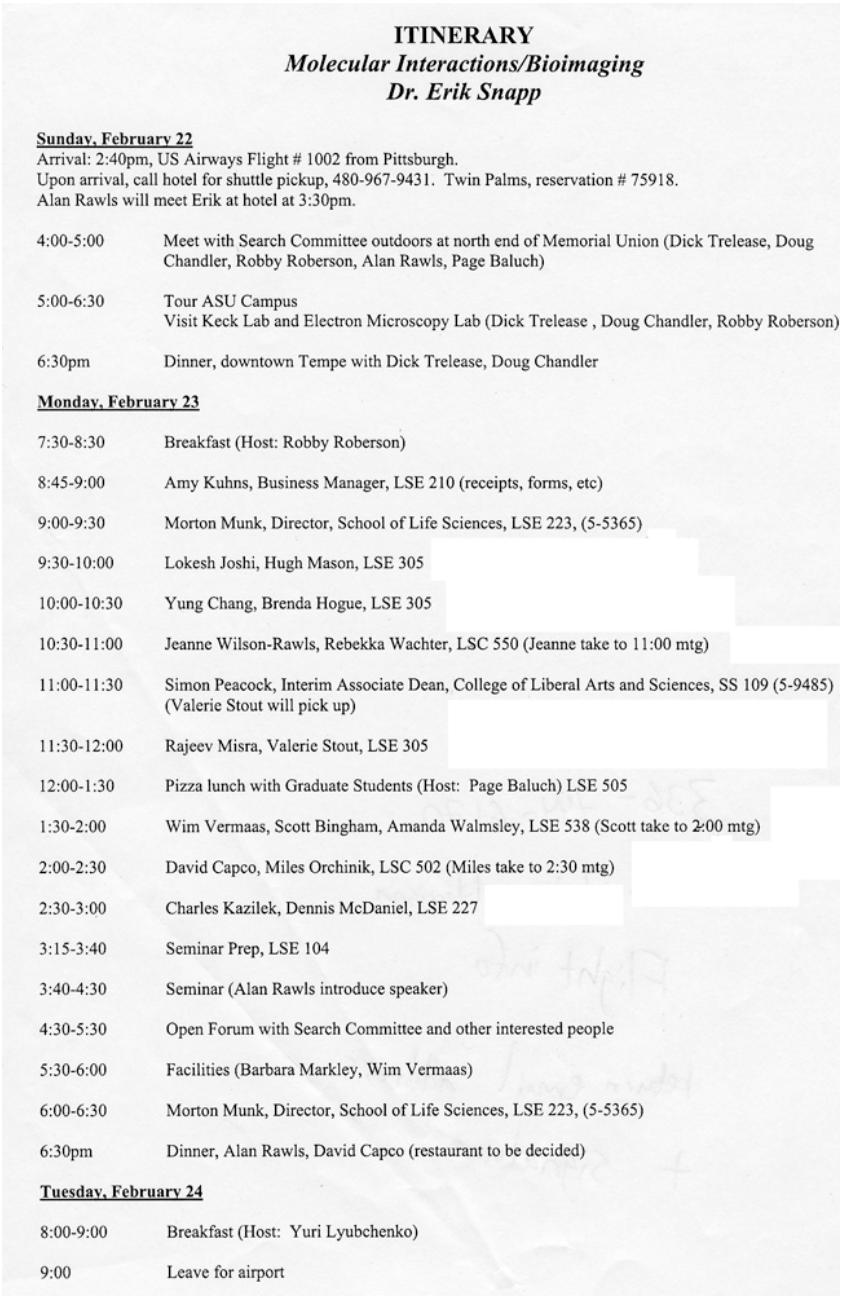
Interview clothes, shoes, extra replacement clothes if something happens, and toiletries

Umbrella

Cash/Credit Card for cab rides, Uber/Lyft account,

I. Two examples of the author's interview schedules

Prepare for a long day.



ITINERARY

Molecular Interactions/Bioimaging

Dr. Erik Snapp

Sunday, February 22

Arrival: 2:40pm, US Airways Flight # 1002 from Pittsburgh.
Upon arrival, call hotel for shuttle pickup, 480-967-9431. Twin Palms, reservation # 75918.
Alan Rawls will meet Erik at hotel at 3:30pm.

4:00-5:00	Meet with Search Committee outdoors at north end of Memorial Union (Dick Trelease, Doug Chandler, Robby Roberson, Alan Rawls, Page Baluch)
5:00-6:30	Tour ASU Campus Visit Keck Lab and Electron Microscopy Lab (Dick Trelease , Doug Chandler, Robby Roberson)
6:30pm	Dinner, downtown Tempe with Dick Trelease, Doug Chandler

Monday, February 23

7:30-8:30	Breakfast (Host: Robby Roberson)
8:45-9:00	Amy Kuhns, Business Manager, LSE 210 (receipts, forms, etc)
9:00-9:30	Morton Munk, Director, School of Life Sciences, LSE 223, (5-5365)
9:30-10:00	Lokesh Joshi, Hugh Mason, LSE 305
10:00-10:30	Yung Chang, Brenda Hogue, LSE 305
10:30-11:00	Jeanne Wilson-Rawls, Rebekka Wachter, LSC 550 (Jeanne take to 11:00 mtg)
11:00-11:30	Simon Peacock, Interim Associate Dean, College of Liberal Arts and Sciences, SS 109 (5-9485) (Valerie Stout will pick up)
11:30-12:00	Rajeev Misra, Valerie Stout, LSE 305
12:00-1:30	Pizza lunch with Graduate Students (Host: Page Baluch) LSE 505
1:30-2:00	Wim Vermaas, Scott Bingham, Amanda Walmsley, LSE 538 (Scott take to 2:00 mtg)
2:00-2:30	David Capco, Miles Orchinik, LSC 502 (Miles take to 2:30 mtg)
2:30-3:00	Charles Kazilek, Dennis McDaniel, LSE 227
3:15-3:40	Seminar Prep, LSE 104
3:40-4:30	Seminar (Alan Rawls introduce speaker)
4:30-5:30	Open Forum with Search Committee and other interested people
5:30-6:00	Facilities (Barbara Markley, Wim Vermaas)
6:00-6:30	Morton Munk, Director, School of Life Sciences, LSE 223, (5-5365)
6:30pm	Dinner, Alan Rawls, David Capco (restaurant to be decided)

Tuesday, February 24

8:00-9:00	Breakfast (Host: Yuri Lyubchenko)
9:00	Leave for airport

Wednesday, March 31, 2004

9:00 -10:00AM	**Dr. John Condeelis & Dr. Robert H. Singer, Co-Chairs** Department of Anatomy & Structural Biology	Co-Chairs Conf. Rm. 629 Forch. Bldg.
10:05-10:45AM	**Dr. Peter Satir, Professor** Department of Anatomy & Structural Biology	Rm. 610 Forchheimer Bldg. 430-4061
10:50-11:30AM	**Frank Macaluso, Michael Cammer, Jeff Wyckoff & Shailesh Shenoy** **TOUR OF THE ANALYTICAL IMAGING FACILITY & MULTIPHOTON LABORATORY** Department of Anatomy & Structural Biology	Rm. 641A/B Forch. Bldg. 430-2890/3547
12:00-1:00PM	**SEMINAR: FIFTH FLOOR LECTURE HALL**	Forchheimer Bldg.
1:15-2:15PM	**LUNCH: Dr. Erik Snapp & Postdoctoral Fellows:** Amber Wells, Alex Rodriquez, Mike Lorenz, & Daniel Larson	AECOM Faculty Club Conf. Rm. Mazer Dorm
2:20-3:00PM	**Dr. Dianne Cox, Assistant Professor** Department of Anatomy & Structural Biology	Rm. 306A MRRC Bldg. 430-4005
3:05-3:45PM	**Dr. Tom Meier, Associate Professor** Department of Anatomy & Structural Biology	Rm. 603 Golding Bldg. 430-3294
3:50-4:30PM	**Dr. Ben Ovryn, Associate Professor** Departments of Anatomy & Structural Biology	Rm. 602 Golding Bldg. 430-2739
4:35-5:15PM	**Dr. Birgit H. Satir, Professor** Department of Anatomy & Structural Biology	Rm. 907A Ullmann Bldg. 430-4063
5:20-6:00PM	**Dr. Pamela Stanley, Professor** Departments of Cell Biology	Rm. 516 Chanin Bldg. 430-3346
6:30PM	**Dinner: Drs. Erik Snapp, Rob Singer, John Condeelis & Dennis Shields**	Le Refuge Inn 620 City Island Avenue Bronx, NY (718) 885-2478

J. Sample Letter of Offer

Dear Dr.Snapp:

It is with great pleasure that we write to offer you a position on the faculty of the [redacted]. Your training, accomplishments, letters of recommendation, and seminar presentation were carefully evaluated by the Appointments and Promotions Committee of the Department and members of other departments and were thought to be outstanding. Your recruitment has everyone's enthusiastic support.

Faculty Appointment and Salary

With acceptance of this letter, you will be appointed to the faculty at the rank of Assistant Professor and In Residence status. This faculty appointment carries with it the eligibility for tenure. Your faculty appointment is subject to the terms outlined in this letter and to the provisions of the College's System of Appointments, Titles, and Compensation Arrangements. This and other policies of the College of Medicine applicable to faculty can be found on the College web site at http://www[redacted]/home/policies2/policies.htm.

Your initial faculty appointment is for a three-year period, and will begin on or about October 1, 2004.

Your salary in your initial year of appointment will be $90,000, and you will be eligible for appropriate annual increments in conformity with the policy for faculty adopted each year. During your first three-year appointment your salary will be supported by University Funds. Upon renewal of your appointment, the source and amount of salary support for this period will be reviewed by the Dean, based upon your performance and within the context of the extramural funding that may by then be available.

Benefits

The institution offers a generous plan of medical and dental coverage, pension benefits comprising 17% of your salary on a shared basis, life and disability income insurance and a $7,600 per year college tuition benefit at any accredited institution for children of faculty members. Details concerning these benefits are readily available from our Faculty Benefits office. If you have any questions in this regard, you can contact the Faculty Benefits Office at [redacted].

Moving Expense Reimbursement

[redacted] will provide funds to assist you in covering your moving expenses, both laboratory and personal, as detailed in [redacted]'s Moving Expense Policy in the Faculty Handbook.

Assistance with the Purchase of a Home

To facilitate your home relocation, [redacted] will provide assistance in financing a home provided: 1. The relocation mortgage assistance to purchase a home is part of your employment commitment; 2. you are relocating within the IRS guideline from a distant geographical location to a home which is within reasonable commuting distance of the College, the distance of that relocation being at least fifty miles plus the distance between your former home and former place of employment; 3. purchase of said home will take place within twelve months from the date of initial employment with the College/University. Subject to University review of title, appraisal of the property, your credit history, and similar considerations, generally this mortgage program will consist of providing a second mortgage of up to 50% of the appraised value of the home, at a rate 3 points below prevailing mortgage rates for comparable loans. Further details are available from Mr. [redacted], Director of Human Resources, at [redacted].

Laboratory and Office Space and Support

The College will designate appropriate space for you by the time of your arrival. We will work with you to prepare this space, at college expense, to meet your needs. Eventually, you may be interested in moving to the new building and if so, can design your space there when appropriate. You will be provided with a one-time start up budget based on your needs to be used for equipment costs and a per annum budget for each of your first three years of appointment for supplies and other laboratory costs. The start up package will total approximately $400,000. Included in this start up package, the College will support a Level B Research Technician (approximately $34,000 per year plus 30% fringe benefits), graduate student or postdoctoral stipend for the same three-year period. This does not include postdoctoral or graduate students supported by other programs, such as training grants or your salary. With the approval of the Dean, these commitments or portions thereof may be extended.

You will have access to all common equipment within the Department of [redacted] and all core facilities, including the [redacted] Imaging Facility. We will guarantee access to comprehensive microscopy including all required software licenses in the [redacted]. User fees for the use of these microscopes (consult the [redacted] web site) will come from your start up package. In addition, the college will support the purchase of a light microscope dedicated to your program's needs at a cost not to exceed $125,000. This microscope may be housed either within your laboratory or within the [redacted] as space is available.

Secretarial and administrative (budgetary and bookkeeping) support will be provided by the Departmental Office.

It is the policy of [redacted] to provide College, departmental, and interdepartmental support for new faculty. However, it is also our policy to encourage investigators to become independent and interactive. The College's expectation is that by the end of your initial three years you will have

secured grant funding sufficient to cover 75% of your salary. If funds from other sources of support become available during the initial three years of your appointment, University Funds support of your salary will be reduced to the extent awarded on such extramural funds. The balance of the extramural funding will be available for support of your program, in addition to your "start-up package".

Research and Teaching Responsibilities

As a faculty member in the Department of [redacted], you will be expected to attract post-doctoral fellows and graduate students on various training programs and training grants administered by basic science departments. The performance and accomplishments of each member of the faculty are reviewed on a regular basis. Faculty responsibilities will be similar to those of your peer faculty members in other departments and will include teaching activities related to cell biology. Teaching will be deferred for one year and committee assignments reduced for two years to facilitate the start up of your research program.

Reliance on Representations

We are relying on the various written and oral representations that you have made in the course of applying for this position, and our understanding is that you have disclosed in full any issues that relate to your professional standing.

One of the strengths of our institution is the mutual support for new faculty within the various departments and the college, and our commitment to the development of investigators with strongly interactive research programs. We are certain that you will find the [redacted] environment both supportive and scientifically stimulating. We look forward to your acceptance of this offer and it is our intent that you enjoy a long, productive, and rewarding career at the [redacted]. Many of us, including Dean [redacted], would be happy to speak or meet with you to address any matters that need further clarification.

We are excited at the prospect of your joining our Department and College. Please sign and return a copy of this letter to us by June 1. And please call if you have any further questions.

With best wishes we are,

K. A Negotiation Email

On 5/7/04 11:24 AM, "erik snapp" <snappe@mail.nih.gov> wrote:

> Dear [redacted],
> That plan sounds good. I would ask that my appended letter include:
>
> 1) My lab would be guarenteed sufficient access to the system. For
> example, my lab would be guarenteed at least 50 hours per week, with
> at least 20 hours during weekday hours from 8 AM to 8 PM. I wouldn't
> object to more time, but I would like something in writing.
>
> 2) During my start-up period, the department will provide the laser
> lines, filter sets, or objectives that are necessary for my research.
>
> 3) My start-up will include any funds sufficient to cover any user
> fees for the diaphragm and FCS systems.
>
> 4) Start-up will include funds sufficient to cover xerox fees, email
> accounts, connection of computers to the internet, regular mail, FAX,
> FedEx, lab coats (and lab coat washing), radiation safety lab
> monitoring and product delivery, radioactive waste pickup, and
> dishwasher/autoclaving personnel fees. I don't know what the fee
> schedules are for these items, so I can't request a dollar amount.
>
> 5) The College or Department will cover costs associated with any
> remodeling required for my lab space. This is alluded to in my
> letter, but I would like it stated more explicitly.
>
> 6) My start-up will include site licenses for my lab for the EPR and
> Huygens Professional deconvolution software, at least for the first
> three years of my start-up.
>
> 7) The other start-up costs I requested, plus the travel and printing
> cost additions.
>
> Finally, I wanted to briefly discuss salary. In our conversation
> on my second visit, you had thrown out a number of $90k as a typical
> starting salary. My letter of offer includes a twelve month salary
> of $80k. My 9 month salary offer from [redacted] is is $65k. Though with
> summer salary, this rises to $86664. Could [redacted] at least match
> this?
> Thank you for your time. Also, I appreciate all of [redacted]'s
> time and answers to my questions.
> Erik

L. Additional Resources

American Society of Cell Biology newsletter (especially the Women in Cell Biology columns, which frequently have career advice).
http://www.ascb.org/index.php?option=com_content&view=category&layout=blog&id=66&Itemid=280

Burroughs Welcome and HHMI offer a free book:
Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty, available for download:
http://www.hhmi.org/programs/resources-early-career-scientist-development/making-right-moves

The Professor is In by Karen Kelsky, Ph.D.
note: this is aimed primarily at applying for positions in Literature and Arts Departments, but has many useful sections equally relevant for the application process in biomedical sciences.

The Academic Job Search Handbook. Fifth Edition. Julia Miller Vick, Jennifer S. Furlong, and Rosanne Lurie. University of Pennsylvania Press.

About the Author

The author grew up on the south coast of Oregon in Coos Bay. His first grade teacher, Mrs. Hill, sparked his early interest in science with a table covered with bones, crystals, fossils, a small microscope, and a terrarium with green anoles. He knew then that he wanted to be a scientist. He got his first research opportunity while attending Harvard College. At the time, he was cooking for the head of research of a biotechnology company and her family. She knew Erik was interested in a career in science and helped him find a summer research position in a protein chemistry lab at the company. This experience confirmed Erik's desire to become a scientist.

Erik went to Oregon Health Sciences University to study protozoan parasite biology with Dr. Scott Landfear and developed an interest in fluorescence microscopy. Green fluorescent protein was cloned and first used around that time and this deeply inspired Erik. Therefore, he sought out a live cell microscopy lab for his postdoctoral training. He joined Dr. Jennifer Lippincott-Schwartz's lab [then] at the National Institutes for Health to learn confocal microscopy and biophysical techniques to study protein organization and trafficking in cells. He worked on structure-function of the endoplasmic reticulum (ER) organelle.

When he started his own lab at the Albert Einstein College of Medicine, he focused on quality control of secretory proteins and ER stress. Erik's lab created the first live cell biosensor of misfolded secretory protein levels. While studying these phenomena, his lab learned that many fluorescent proteins perform poorly in environments other than the cytoplasm of cells, e.g., in the ER and other organelles. In cell organelles, the luminal chemistry can differ greatly from the cytoplasm, which can cause normally cytoplasmic proteins to misfold, become quenched or get modified in inappropriate ways. In 2016, his lab developed a new palette of inert fluorescent proteins, the "mox" fluorescent proteins, suitable for a variety of cellular environments.

As a professor, Erik served on several faculty search committees. He also discovered that in addition to research, that he enjoyed teaching and mentoring young scientists. He developed courses in microscopy and experimental design, as well as lectures in Cell Biology and Responsible Processing of Images. He served as the Chair of his department's graduate committee, on the Einstein Graduate Executive Committee, and the Belfer Postdoctoral Committee. In 2016, Erik left Einstein to pursue helping high school interns, undergraduates, research techs, graduate students and postdoctoral fellows with career development and graduate education at Janelia Research Campus. In his spare time, Erik enjoys cooking, bird watching, long distance running, and wildlife photography.



Photo by Matt Staley.