HIGHLIGHTS FROM THE 2010 NIH CAREER SYMPOSIUM

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Bright Future for a Big Community: Life and Lessons from Kathie L. Olsen, Ph.D.

Lindsey S. Garver, Ph.D.

Many of us have experienced the inner stirrings of change and growth upon hearing inspirational words. For Kathie L. Olsen, Ph.D., those words came unexpectedly when, as a young professor in the days before Microsoft, she asked an assistant to prepare a manuscript for submission. A senior colleague turned to her and bitingly quipped, “What? Can’t you type?” and her quest for something new ignited.

Dr. Olsen, Vice President of International Programs at the Association of Public and Land-grant Universities, peppered her keynote address to career-questioning, change-seeking post-docs with many such anecdotes. Some were inspiring--she reflected that what she really learned from her Ph.D training was not "how to do science" but, instead, "how to think". Some were infuriating--as a new female assistant professor with two grants, she was paid less than her collaborating male post-docs. Others were just simple truths--the brains of students and post-docs are seemingly adapted to find free food.

The first part of her talk reflected her optimism about science careers of all types and those who seek them. Clearly knowing her audience, Dr. Olsen pulled real data from a multitude of studies showing that science is on the rise. Of many fields, the life sciences enjoy greater and more stable income, low unemployment and expected increases in job demand. Health-related issues and research were the number one point of public interest (despite what People Magazine may have you believe) and “scientist” ranked as the second-most prestigious profession, losing out only to firefighters. Dr. Olsen believes that all these indices point toward bright and consistent futures for current post-docs.

Having made the transition from pipette to policymaking, Dr. Olsen next gave insight into careers away from the bench. She described having an "empty pit" feeling while in her tenure-track position and, despite her advisor's warning that he "didn't train her for that," she sought to fill that void with a career that offered an emphasis on community rather than experiments and publications. She condemned descriptions like "alternative" and "non-traditional", asserting that all the day's speakers were scientists working together to advance science and reminding us that this larger community creates a network through which we can make progress.

Finally, the audience was treated to a collection of "lessons learned" from the experienced and enthusiastic speaker. She addressed general points, such as being flexible, accepting change, allowing for mistakes, and being willing to move from a comfort zone. But, more specifically, Dr. Olsen asked us to keep the moral high ground when faced with challenges, to be aware of who our friends are because these are the people we turn to in moments of uncertainty, to find a

good mentor and to be a good mentor because our community is strengthened as those bonds are formed, and, difficult though it may be, we should be willing to say "I don't know" or "I don't understand" if we want to gain the most knowledge.

Then, she threw on a pink boa (yes, there were props!) and implored us to cultivate a sense of humor and approach life with attitude. And, as final food for thought, she described the ultimate reason for having any sort of career in science--to attain immortality through the knowledge we create, regulate and disseminate to the rest of the world. Our society is international and has become increasingly based on knowledge, putting us at the global forefront and charging us with great responsibility and granting us great opportunity.

Clearly, Dr. Olsen's optimism is well-founded, and her life lessons are inspiring, regardless of whether she can type or not.

Lindsey S. Garver earned her doctorate in Molecular Microbiology and Immunology at The Johns Hopkins School of Public Health and has since spent nine months in her postdoctoral position in the Laboratory of Malaria and Vector Research within NIAID. She is currently exploring the molecular interactions between the malaria parasite and the immune system of the mosquito vector and is developing an interest in science administration.

A Postdoctoral Survival Guide to the Academic Life **Idalis Villanueva, Ph.D.**

Passion, fearlessness, and hard work were the core concepts highlighted in the Life in *Academics* session at the 2010 NIH Career Symposium. The question and answer session aimed to inform postdoctoral fellows about the requirements of distinct institution types, the academic application process, and important survival tips for evaluating an academic job offer. The diversity of potential academic environments was represented by faculty from liberal arts, R1 research, and medical institutions.

Together, their stories revealed that each institution type varies on the "tenure clock" as well as the required number of papers published and grants submitted to be competitive for tenure. "In a small liberal arts college, teaching is just as important as publications…the difference is that when teaching a course, you don't have a teaching assistant so you're required to grade homework and tests in your spare time. For research, the bulk of the work is done by you," indicated Michelle Dykstra Snyder, Ph.D. from Towson University.

Amy Cheng Vollmer, Ph.D. of Swarthmore College added, "for every one hour lecture, you need 6-8 hours to prepare…since publications are also important for tenure in a smaller institution, you need to develop projects that are 'ready to roll' for the students. The output and motivation by the students will determine the progress of your research."

In discussing the academic application process, Jon Lorsch, Ph.D. from The Johns Hopkins University School of Medicine shared his experiences as part of an academic search committee. "Usually, our institution receives 150-200 applications for a given position. We look for publication records, graduate school and postdoctoral accomplishments, and letters of recommendation. We consider whether the proposed research is a good fit for the institution and how well-rounded the applicant is."

Christopher Jaroniec, Ph.D. from The Ohio State University added, "for your written [research] proposal, be concise while providing the reader with general approaches to answer a given question or hypothesis. Include reasons why your model system was selected and consider a realistic timeframe to complete proposed projects."

Once a position is offered, there are still important considerations before proceeding. The panelists strongly recommended keeping all offer agreements in writing. "Inform yourselves. Know what startup package was offered. Is the offer proportional to the institution's expectations? Additionally, ask about funding plans in case an administrative change occurs during your tenure," stated Dr. Cheng Vollmer.

“With the economy, keep in mind that the time lapse between grants will be longer than normal. Is the institution prepared to support your students and research in case this happens? Also, inquire on the amount of preparatory classes you need to teach,” Dr. Dykstra Snyder indicated.

Dr. Jaroniec agreed saying, “yes, a prep class takes a long time…time you can use towards grant writing.”

Dr. Lorsch suggested that potential faculty, “know your lab space and equipment budget but demonstrate to your fellow PIs that you are willing to share…be wise about how you manage your startup package.”

While starting an academic position requires tremendous hard work and effort, all the panelists agreed that life and career can co-exist in harmony. Dr. Jaroniec summarized it best saying, “it’s all about time management. I don’t work 12-14 hours a day. I have a flexible schedule. That’s the thing I love about my job.”

The Life in Academics session demonstrated that although the academic career track is challenging, it has its rewards. Finally, it illustrated that academia is unique: a career that cannot fully be explained only experienced.

Idalis Villanueva is a postdoctoral fellow in the National Institutes of Neurological Disorders and Stroke. She is an advocate of educational outreach, collaborating with NIH’s OITE and the PROMISE program at the University of Maryland-Baltimore County. In the future, she hopes to encourage other students to pursue STEM careers.

Navigating the Academic Search Process **Sean Barron, Ph.D.**

Did you know that an academic search committee will only spend 5-10 minutes reviewing each application? How do you get noticed in the crush of 300 talented applicants? Representing both research and teaching institutions, the panel offered advice on how to grab the attention of the search committee and make them say “I want to meet this person.” Networking and mentoring are the keys to getting on the search committee’s radar, and the same principles that we used to find our postdoctoral fellowships apply here as well!

Before starting the search process, there are things you can do to stand out in the scientific community. Networking with other scientists at the national and local level will go a long way towards increasing your visibility. The panel agreed that all of their recent successful hires had a connection to the institution. Search committees also want to see evidence of leadership, so get involved as a postdoctoral fellow at the NIH and in your favorite professional scientific organization. Amy Cheng Vollmer, Ph.D., Professor at Swarthmore College, stressed that excellent candidates standout no matter what. After you have been evaluated on your scientific merits, your professional network and connection to the institution can make the difference between the short list and an offer.

With such limited time to initially screen applications, what will the search committee look at first? Ibrahim Ades, Ph.D., Associate Professor at the University of Maryland at College Park, stressed that the cover letter is the first part of the application that is reviewed and serves as your introduction to the committee. Why are you interested in this position? Why are you enthusiastic about this institution? What are (and have been) your research interests? The cover letter will either prompt the committee to read the other parts of your application or to move on to the next packet!

After the cover letter, the next important parts of your package are the letters of recommendation. The panel agreed that the other application materials, such as the CV and publications, are generally skimmed over during the initial review for relevance to the advertised position.

Publications. It goes without saying that you should publish frequently, but quality trumps quantity. The committee is more interested in your contribution to the publications, and the novelty of the work. Did you bring a new technique, or take the lab in a new direction? These are the things that not only make your CV stand out, but help your mentor write a glowing letter of recommendation. Related to publications is your ability to apply for grants, and prior evidence of funding goes a long way to convince the search committee you will be able to get grants throughout your career.

The panel concluded the session by offering practical advice for the interview. Every person you will meet that day is for a specific reason, so be well-rested and on time. The people with whom you will speak could be your future colleagues, so read a paper or two and find a common link between their research and yours. Your fit within a department boils down to how you will complement the existing research. Finally, do not be afraid to informally bring up family concerns, such as the "two-body" problem or questions regarding child care, as the search committee wants to help you succeed.

Ultimately, the decision to hire you will depend on your ability to do independent research, your fit within the department and institution, and your probability of success as a faculty member. You had to "wow" your graduate school and postdoctoral mentor to get those positions, so be prepared to "wow" the faculty search committee!

Sean Barron recently graduated from the University of North Carolina at Chapel Hill with a Ph.D. in Neurobiology. He joined the lab of Dr. Chris McBain in NICHD this past April as a postdoctoral fellow, and will study how acetylcholine affects synaptic properties of the developing hippocampus.

Getting Academic Tenure **Julnar Issa**

"Sometimes I do regret that my husband takes my kids to gymnastics and I don't." This was one of many thoughts on working towards tenure expressed by Joana Carneiro da Silva, Ph.D. at the *Getting Academic Tenure* panel at this year's career symposium. Dr. Carneiro da Silva is working towards tenure at the University of Maryland School of Medicine in Baltimore. "It's not easy, but you have to see where your heart is," she explained.

What is the tenure process like? The panelists emphasized that the requirements for obtaining tenure vary greatly by the institution. Institutes typically have guidelines for obtaining tenure written up in a faculty handbook. These days, these faculty handbooks are posted online.

Matthew M. Ames, Ph.D., a tenured professor at the Mayo Clinic, emphasized the importance of strong publications in achieving tenure at his institution. Committees use publications to help them predict who will likely be solid and productive in the long-run. If a candidate has worked on a paper that has not been published, the committee will still want to know that a work is in progress. Julio C. de Paula, Ph.D., a dean and professor at Lewis & Clark College, noted that if a candidate collaborated on a work he should state his role in this collaboration to the committee. The committee will want to know that the candidate played a prominent role in the research.

Dr. de Paula mentioned that, in order to get tenure at a typical liberal arts college, a candidate is required to have a teaching portfolio in addition to a research portfolio. Susan Parrish, Ph.D., who is working towards tenure at McDaniel College, a private liberal arts school, explained that, at her institution, tenure candidates are rated in the areas of teaching, research, and administrative service. Since McDaniel College is a teaching college, candidates are required to receive the highest possible rating for teaching.

Although the tenure process sounds confusing and complicated, institutions typically offer guidance and support. For example, at Lewis & Clark College there are two scheduled pre-tenure reviews of a candidate's progress. Candidates are also provided with mentors, and their expectations are highlighted in the faculty handbook. At the Mayo Clinic, there is support for candidates if they lose their funding.

What should one expect life to be like after getting tenure? Many believe that having tenure means more free time, special privileges, or different job duties. Clifford R. Weiss, M.D., who is working towards obtaining tenure at The Johns Hopkins University School of Medicine, stated that receiving tenure does not decrease your workload or the expectations placed on you. In fact, he believes all the faculty members he knows work harder than he does. Dr. Ames explained that receiving tenure was actually anticlimactic for him. For the most part, he felt he was doing the same things in academics after receiving tenure that he had been doing before receiving tenure.

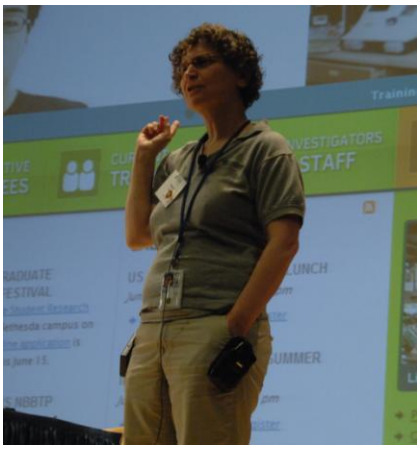
Dr. Ames believes that having academic tenure these days really means that, in difficult times, your institution will support you both financially and emotionally. To Dr. de Paula, tenure means giving back to your institution as much as you can. He stated, “I think of tenure as a privilege and an honor…Tenure is the beginning of something, not the end of something.”

Julnar Issa is an Intramural Research Training Award Recipient. She works at the National Institute on Alcohol Abuse and Alcoholism.

Scientists Teaching Science: Building the Next Generation **Shana R. Spindler, Ph.D.**

As the scope of science and technology grows at an exponential rate, so expands the need for qualified teachers to disseminate complex information to the world's next generation of leaders. Who better to teach our budding youth than scientists, the very individuals who have contributed to the pool of scientific knowledge and can draw upon direct experience to accurately teach difficult scientific concepts. During the *Scientists Teaching Science* session at the 2010 NIH Career Symposium, a well-selected panel of diverse science educators discussed reasons why scientists might want to pursue a teaching career, the various science education professions available, and ways to enter the science education field.

One of the panelists, Patrick Brandt, Ph.D., Associate Director of Biomedical Graduate Training at the University of North Carolina, explained that scientists entering his discipline "share interesting symptoms," such as a passion for sharing the big picture, a strong desire for teaching, outreach, and mentorship, and the ability to derive satisfaction from providing a supporting role in science. In his position, he enjoys being a career mentor to five-hundred biomedical graduate students, managing a Howard Hughes Medical Institute-funded translational medicine program, and acting as an "agent for change" by continuously incorporating successful practices pioneered at other universities. As Dr. Brandt exhibited great drive for graduate programs, the remaining panelists agreed that other science education careers require similar passions and goals.



Scientists can choose from a wide array of careers in science education. Jayatri Das, Ph.D., Senior Exhibit and Program Developer at The Franklin Institute, shares her love of science by generating museum exhibits that can remain on display for up to ten years. She also coordinates workshops, develops pamphlets, and organizes traveling science exhibits. By educating an audience of children and their families, Dr. Das explained that she has the opportunity to reach a lifelong audience. "It's what we call K to gray," chuckled Dr. Das.

If the classroom setting seems to be more appealing, a career as a high school science teacher could be an attractive opportunity. Michael T. Kim, Ph.D., Teacher at Thomas Wootton High School in Montgomery County, enjoyed teaching undergraduate and graduate students throughout his doctoral and postdoctoral training—so much so that he left the bench to enter the "Transition from Laboratory to Classroom" program. As a high school teacher, Dr. Kim explained that he's not really teaching science; instead, he's teaching young students how to think and solve problems.

Once a postdoctoral fellow finds an exciting avenue in science education, the fellow can pursue opportunities that will prepare him or her for this new career. Latarchal D. Morton, Director of Learning Programs at Emory University, suggested exploring a non-traditional postdoctoral position combining both research and teaching. In doing so, Dr. Morton gained valuable

experience in teaching portfolio development and curriculum design. She also studied job descriptions to learn what skills potential employers desired and then sought skill-building experiences, such as creating workshops or hosting symposiums. The panelist all agreed that the postdoctoral skill set that many take for granted—critical thinking, creativity, analytical aptitude, and presentation skills—is applicable to a science education career and that networking is critical to meet others already in the field.

Throughout the discussion, the panelists demonstrated an undeniable passion in describing their career transitions and current professions. "When passionate, transitions—while challenging—seem natural," explained Kathleen A. Travers, Ph.D., Senior Lecturer at the University of Maryland. Her winding path from writing poetry to working in business to achieving a doctorate in teacher education was, as she put it, the best decision she ever made. Dr. Travers captured the unbridled enthusiasm of the panelists in her final statement: "I've not only made a difference, I've changed the world."

Shana R. Spindler, Ph.D., IRTA Fellow at the National Institute of Child Health and Human Development, currently studies the genetic regulation of cellular morphogenesis in the Zebrafish lateral line. More of Dr. Spindler's writing can be found at her blog "The Bottom Line in Bioscience," located at www.theblib.blogspot.com.

Research Careers in Industry **Miia Suuriniemi, Ph.D.**

"Do what you love to do, but be willing to take some risks" was a major theme of the *Research Careers in Industry* session at this year's NIH Career Symposium. While transitioning from academia to industry requires a unique skill set to make you attractive in this highly competitive job market, it can be well worth your effort.

The four panelists described their current work in industry and suggested some key skills worth developing in order to get your foot in the door and to make you stand out from other applicants. One of the most important skills according to Evguenia Svarovskaia, Ph.D. from Gilead Sciences is your ability to communicate. It is essential to present yourself well to a company. As far as technical skills and expertise go, those with a PhD and a few years of post-graduate experience should be at a similar level. However, the impression an applicant gives in an interview is what really separates a new hire from the rest of the crowd.

Several responsibilities in an industry job require skills that are familiar to a postdoctoral scientist. If you enjoy presenting at conferences, Michele Gunsior, Ph.D. from Covance Laboratories has good news for you. She is currently a Principal Investigator and often attends meetings to inform the scientific community of the ongoing projects at her company. Writing is another valued skill, and publishing is one method of advancement at any company, according to Hosein Kouros-Mehr, M.D., Ph.D. from Genentech/Roche. All the panelists rejected the common belief that companies are purely product-oriented. There is always basic fundamental research behind every product.

Most importantly, the panelists emphasized being pro-active and open to new things. They stressed that fellows should make the most of opportunities today by learning and enhancing your skills right here at the NIH. Talking to colleagues and PIs in your branch or institute is a great place to start.

There are many reasons why a scientist would choose to pursue a career in industry. While one may be after a higher salary, the level of efficiency in industry may appeal to another. Brandon Jeffy, Ph.D. from AstraZeneca Pharmaceuticals explained that his motivation was his desire to get closer to the "end-product".

So, are there any disadvantages to pursuing a career in industry? In a company, one is expected to reach a project's goal by whatever means necessary and may include sacrificing research of "his or her own interest" to some extent. You may also need to relocate along the way, either to a different branch within the same company or to a new company altogether. Industry has also been especially affected by the financial downturn, demonstrating the lack of job security in industry.

Many of the questions from trainees showed concern about choosing the right postdoctoral environment when considering a move to industry. First, the panelists encouraged the completion of a post-doc since most of the biological scientists in industry have postdoctoral training. However, there is no requirement for an industry post-doc, as many might think. Academic training is highly recommended, especially if you want to keep both industry and academia as viable career options. It is also important to choose your mentor wisely. A mentor who supports your future career plans in industry can help you achieve the necessary skills as well as good points of contact for networking.

Miia Suuriniemi is a postdoctoral fellow in the NCI/CCR/Genetics Branch who completed her Ph.D. in Finland. She is fascinated by today's state-of-the-art genomic technologies, and the information they will hopefully provide to cancer research.

Science in Industry: Non-Bench Scientific Careers **Todd Gibson, Ph.D.**

If you love working in the lab or can not imagine spending your days away from the bench, you may not need to read this section. If, however, you maintain a strong interest in science but think you might like to explore career alternatives such as business, sales and marketing, or project management, by all means keep reading. There are numerous opportunities in industry for science Ph.D.s to transfer their current skills to a variety of non-bench positions, as evidenced by this session's four speakers, who gave brief introductions then engaged in an informative and wide-ranging Q&A period.

Jenelle Timmins, Ph.D. is an Associate Program Manager of research programs at Regeneron Pharmaceuticals, Inc. She performs a variety of project management duties, including leading cross-functional research and technology development teams and serving as a liaison with scientists both within and outside the company. Matthew Kiser, M.S., M.B.A. identifies, establishes and manages strategic business partnerships within the pharmaceutical industry in his position as Executive Director of Pharmaceutical Business Development at Martek Biosciences Corporation. Dzung Nguyen, Ph.D is the Associate Director of Global Sales and Marketing at BioLegend, a small biotech company specializing in antibody-based research tools. Finally, Nick Kaludov, Ph.D. is an experienced biotech executive who has successfully commercialized biotech research platforms, founded a biotech company, and established several corporate alliances. His entrepreneurial spirit is demonstrated by his current position as Vice President Scientific Operations at Gradient Biomodeling LLC, a company with a total of three employees!

A popular misconception seems to be that leaving the lab means abandoning science. In fact, the speakers in this session all agreed that one of the chief attractions of their jobs was the ability to expand their skills and responsibilities beyond the bench while staying "in touch" with the science and continuing to interact with other researchers. Monotony is certainly not a concern in these non-bench careers, as another common theme among the speakers was the incredible diversity of their day-to-day activities. Drs. Nguyen and Kaludov emphasized the benefits of working in a small company, particularly the dynamic work environment and the opportunity for recognition and rapid advancement. For those looking to expand their skill sets, an additional benefit of working for a small company is the requirement for employees to work in many different areas and "wear many hats", whereas in a large company, each employee may be pigeonholed into a specific job function.

So what is needed for success in non-bench industry careers? In addition to the scientific expertise shared by all fellows at NIH, the speakers agreed that excellent communication skills

and the ability to work well in teams are vital attributes for job candidates. Lab research can often be independent and self-directed, but the industry setting demands interdependence and teamwork to achieve goals set by the company. As Mr. Kiser pointed out, “in industry there is no such thing as ‘your project’”. Other important attributes for success mentioned by the speakers included enthusiasm for the company’s work and goals, an ability to think globally and “see the big picture”, and flexibility.

How can you make the bench-to-business transition? Dr. Timmins suggested being creative in thinking of how your current skills and experiences can translate to other arenas. For example, a typical NIH postdoc will not have any specific experience as a “project manager”. In reality, we all manage our own projects every day, including relevant experience in areas such as scheduling, setting up collaborations, summarizing results, and meeting deadlines. Dr. Nguyen emphasized the attractiveness of Ph.D.s for any position in a biotech company, regardless of the specific skill set involved, due to the general qualities required to complete a Ph.D. (i.e. critical thinking, persistence, creativity, and discipline). Of course, all the speakers were adamant about the critical importance of networking when it comes to actually finding an industry job. Each had a personal story of how networking led directly to a job offer. The panelists suggested talking to as many people as possible and setting up informational interviews. They also suggested that the most important step was getting in the door to industry. One option would be to start out in a bench job, prove yourself to the company and then move to a non-bench position.

Audience members had a number of questions regarding the required credentials for non-bench industry jobs, such as postdoctoral training, MBA degrees, and publications. For most jobs, the speakers said that an MBA is not required, though it could provide a “leg up” during the hiring process. While postdoctoral training is also not typically required, it can be invaluable in terms of gaining the necessary experience, confidence and independence. Publications in peer-reviewed journals are less important in industry than academics, but even for non-bench careers a strong publication record serves as a testament to one’s ambition, work-ethic, and achievement.

The session ended, appropriately enough, with the following question: “If you could offer us one piece of advice, what would it be?” Dr. Kaludov’s advice was to start thinking about what you really want to do as early as possible and think strategically about your career. Mr. Kiser said simply “don’t be afraid to fail”, and Dr. Nguyen drew on his own experiences to advise that “if plan A doesn’t work, remember that plan B or C might be even better”. Finally, Dr. Timmins concluded the session saying “Make sure your job is a match for you. And Network!”

Todd Gibson recently completed his Ph.D. in Epidemiology through the Yale University – National Cancer Institute Cooperative Training Program. He plans to continue his research in cancer epidemiology as a postdoc at the NCI as part of the Cancer Prevention Fellowship Program.

Science in Business **Jeffrey Zhao, Ph.D.**

Imagine that you, a postdoctoral fellow, and your advisor have invented a rapid detection kit for a major disease. You decide to enter a brave new world, and launch a start-up biotech company based on the invention.

Chances are, during this exciting process, you would meet technology transfer officers, patent lawyers, and business consultants, such as Lawrence Carroll, Ph.D., J.D., Katie Darius, Ph.D., John Julias, Ph.D., and Clifford Michaels, Ph.D., who were the four panelists featured in the *Science in Business: Careers in Scientific Consulting and Intellectual Property* session of the NIH Career Symposium.

Dr. Michaels, working in the Office of Technology Transfer of an academic institute (Emory University), would evaluate your invention, and draft patent applications. The patent would protect your intellectual property (IP), the most valuable asset for a biotech company. Dr. Carroll, a patent attorney at a prominent law firm (Womble Carlyle Sandridge & Rice), would go to court to defend your company's position if another company attempted to market the same detection kit without licensing, or if you were sued for violating patents of other companies. If your company wants to develop and market new products to ensure long-term success, Dr. Darius and Dr. Julias, both working for consulting firms specializing in life sciences (The Frankel Group and Booz Allen Hamilton, respectively), could help you devise business strategies after conducting interviews and analyzing financial and business data.

Consultants and attorneys seem to be different species from life scientists in a lab. However, Ph.D.s with excellent scientific training and solid quantitative and analytical skills are actually highly valued in consulting and IP law firms. A Ph.D. is generally mandatory for patent agents or lawyers focusing on biotech and drug discovery because the clients, who mostly have Ph.D. or M.D. degrees, expect the agents to understand their cases quickly and accurately. Four first-author publications helped Dr. Darius land her job. Postdoctoral training, although not required, can be very advantageous to job candidates for law and consulting firms. Both Dr. Julias and Dr. Carroll were postdoctoral fellows in NIH, where they became more independent researchers, further developed their communication skills, and networked with people in academia and industry during conferences.

To flourish in consulting and law firms, scientists need additional skills that are not typically included in laboratory training. Outstanding communication and people skills are essential for lawyers and consultants, who often explain complex scientific concepts, defend their strategies convincingly, and manage clients with various personalities. You can demonstrate your writing strength with review articles and writing samples in non-scientific publications, which are especially important for non-native English speakers. Being a fast learner is important for a

consultant to be able to adapt quickly to ever-changing situations. A consultant also needs to pay more attention to the big picture than to miniscule details.

To set them apart from other job seekers, the panelists went the extra mile. Dr. Darius obtained a certificate in management from the Wharton Business School, while Dr. Carroll passed the national patent exam before working as a patent agent. An internship is a great stepping-stone for a permanent position in IP law firms, technology transfer offices, and consulting firms. Moreover, an internship will assure you it is your dream job before you jump ship.

Now take a deep breath, and ask yourself seriously: are you more excited about conducting research and making new discoveries, or do you excel in debates and negotiations, enjoy intellectual discussions and team-work, all while tackling challenges faced by a wide range of clients? If you find yourself leaning toward the latter, a career in IP or consulting may be for you!

Jianfei "Jeffrey" Zhao is a postdoctoral fellow in the National Cancer Institute. He obtained his Ph.D. in Biochemistry from the University of Oregon. Jeffrey is originally from China where he graduated from Peking University with a B.S.

Career Options for Clinicians **Inka Sastalla, Ph.D.**

Finding a position that is just right for you requires determination and a cart load of good advice. The panelists invited for the session *Career Options for Clinicians* all have found their niches, which ranged from drug development in industry, to research, clinical care, teaching at a medical school, and even "The Dark Side" of drug development, government regulation at the Food and Drug Administration (FDA).

One of the main challenges M.D.s are confronted with at medical universities is efficient time management. Three members of the panel, Vecihi Batuman, M.D., Chief of Medicine Service at the VA Medical Center in New Orleans, William Savage, M.D., and Clifford R. Weiss, M.D., both Assistant Professors at The Johns Hopkins University School of Medicine (JHMI) in Baltimore are involved in patient care, teaching, and research.

How do they balance these three demanding tasks? Dr. Weiss pointed out that while JHMI has no extra teaching requirement, bedside teaching is part of the clinical duty, and sacrifices are necessary to accommodate all three responsibilities. According to Dr. Batuman, who additionally holds a full professorship at Tulane University Medical School, equal division of all three tasks is also not realistic. "A successful research career requires 70-80% of time allocated to bench work".

However, once established, MDs have the option of recruiting more researchers. If you do not want to neglect your research career, fellowships such as the NIH Career Development Awards give junior faculty members "protected time" for their research, according to Juan Lertora, M.D., Ph.D., Director of the Clinical Pharmacology Program at the NIH.

If you decide to move into drug regulation and development, patient care and research can also be combined. Steven Ryder, M.D., President of Astellas Pharma Global Development, and Susan McCune M.D., M.A.Ed., Deputy Director of the Office of Translational Sciences at the FDA outlined options available to MDs. According to Dr. McCune, the FDA offers numerous opportunities for early-stage clinicians, and available fellowship programs allow both patient care and research. If you are interested in working outside of the U.S., many clinical studies are performed in other countries, and the FDA has international offices. Dr. Ryder, who oversees processes involved in the development of drugs ranging from discovery to clinical trials, pointed out that in industry, it is advisable to focus on either research or translational science, as both are often impossible to combine in one career. However, while he was working at Pfizer, many colleagues stayed associated with hospitals and were involved in patient care.

How do you choose the path that is right for you? The panelists agreed that the first and most challenging hurdle is the decision-making process. If you are not sure which direction to take your research to, Dr. Savage advises to "do what you love to do", but choose an area having a high chance of success. Asking questions like "What is the impact of the outcome of my research?" have helped him to find his particular niche.

Most importantly, the panelists emphasized the significance of networking and being guided by mentors. Choosing a great mentor is difficult, and Dr. Batuman recommends that young clinicians pick one that already has a successful career. If you decide to move into industry, Dr. Ryder believes that choosing a quality organization involved in a broad range of research will put you in contact with people of diverse expertise, giving you more alternatives when choosing a specific field.
Once you have overcome the greatest challenge of finding your career path, everything else will fall into place.

Inka Sastalla received her Ph.D. from the Technical University in Braunschweig, Germany. She then did a one year postdoc in the lab of Dr. S. Chhatwal at the Helmholtz Center for Infection Biology in Braunschweig, Germany where I investigated virulence factors and two-component regulatory systems of Streptococcus pyogenes. In 2006, she joined the lab of Dr. S. Leppla at NIAID, where she currently works on the pathogenesis of Bacillus anthracis. She is an editor on the Fellows Editorial Board at NIH and a board member and webmaster of the Bethesda Chapter of the Association for Women in Science.

Where Discovery and Legislation Meet: An Overview of Science Policy

Allison Bierly, Ph.D.

In the midst of the power struggle on Capitol Hill between politicians vying to make their vision of America a reality, those who take up the fight for science policy are a critical voice. Tobin L. Smith, the Vice President for Policy at the Association of American Universities, laid out the battle lines for a packed seminar room at the Career Symposium on May 18. His seminar focused on defining science policy, explaining why the field is difficult to understand and navigate, and elucidating why scientists should play a role in policy-making.

Mr. Smith described science policy as consisting of two broad categories. The first encompasses the decisions about how to fund and structure support for scientific research, while the second involves the use of scientific knowledge to improve decision-making in policy areas such as clean air and health care. He emphasized the complexity of the field, pointing out that policy is made at all levels, from executive orders by the President to interpretation of the laws by individuals. Adding to the number of cooks in the kitchen is the multitude of Congressional committees claiming oversight for various areas of research. Mr. Smith referenced Admiral James Watkins' statement that he reported to nine agencies and no less than forty-seven Congressional committees and subcommittees for oversight of oceanographic research alone.

With so many committees devoted to the topic of science policy, one might think that adding bench-trained scientists to the mix would be superfluous. Not so, according to Mr. Smith. He explained, "The reality is that many policymakers do not understand science," and offered a telling statistic: in Congress, less than five percent of members come from a science or engineering background. In fact, the Congressional Research Service reported that in the current Congress, only 23 members hold Ph.D.s, compared to 225 members who hold law degrees. Legislators are often strongly influenced by their constituents' correspondence, Smith revealed, and they want a clearly defined cause and effect relationship between the funding they give and the results they get. This is not always a realistic expectation in research, and therefore the input of trained scientists is necessary to "transcend that cultural divide."

Asked to describe a typical day on the job, Smith responded, "There is no typical day." However, his current work involving the America COMPETES Act requires him to attend Congressional hearings on the Hill to monitor the progress of the legislation. He then spends his time on the phone, relaying information to Federal Relations Officers at universities. He also attends meetings with corporate allies to plan strategies for garnering support of basic physical research. Although not a scientist himself, Smith had several key pieces of advice for those scientists wishing to break into the policy field from the bench. He

emphasized the importance of networking, and suggested getting to know one's Congressional staffers as well as finding members of one's professional society who hold policy jobs. Additionally, policy-oriented scientific organizations such as Scientists and Engineers for America can offer exposure to the field, as can the annual AAAS Policy Forum. He added that while the AAAS Policy Fellows program is useful, there are many other ways to gain experience as well.

Mr. Smith's overview of the field of science policy gave attendees an excellent foundation for understanding this complex career option. Some of the most significant challenges facing our world today and in the future will require the expertise of scientists in policy-making positions. If joining the fight to influence our leaders for the advancement of scientific discovery appeals to you, a career in science policy may be just the career you are seeking.

Reference: Amer, M. and Manning, J. 2008. "Membership of the 111th Congress: A Profile." Congressional Research Service.

Allison Bierly is a CRTA fellow at NCI-Frederick. She received her Ph.D. in Immunology from Cornell University in 2009 and her bachelor's degree from Ursinus College in 2003, majoring in Biology and English. She currently resides in Mount Airy, Maryland.

Careers in Public Policy Making **Carolyn Graybeal**

Do not be limited by your current expertise. This was the consensus from panelists of the *Careers in Public Policy Making* session. As they describe it, a career is public policy is an opportunity to delve in to a variety of different topics, become involve in a range of important issues and influence the way science is applied.

The focus of public policy is to bridge the gap between science, politics and the general public. As a scientist in this field, you are viewed as the expert on the topic at hand, acting as a resource for information or potentially an active voice during policy negotiations. You function as a conduit between the scientists conducting the research and the administrators applying that research. Stepping into that role with a science background gains you credibility in both parties that can facilitate the process.

The field of public policy is vast, so it is important to be open to ideas and topics not necessarily related to your past research. With a background in Material Science and Engineering, the career of Ticora Jones, Ph.D. has taken a circuitous path from teaching science to middle school children to working on taxes and national resource management. Projects can also result in unexpected working collaborations as evidenced by AAAS Center for Science, Technology and Security Policy Associate Program Director Kavita Berger, Ph.D. who has crossed paths with both the FBI and Department of Homeland Security.

As with any job there are negatives and policy certainly has its share of frustrations. Often you will be expected to balance multiple projects at once. Dr. Jones finds this both invigorating and frustrating. She cheerfully quipped, “I now have ADD.”

Acting as a science liaison will not always be smooth sailing. Occasionally, it will be a struggle to push your point across, so you need to be assertive and a good self-advocate.

The panelists had plenty of advice on entering the field. While D.C. might have the highest concentration of fellowship and internship opportunities, FDA Commissioner’s Fellow Kevin Whittlesey, Ph.D. recommends looking into state and local agencies. These programs are looking for individuals with leadership potential, passion and a history of social engagement. When applying to any policy position, demonstrate a concrete interest in policy. This can range from op-ed pieces, professional society memberships or volunteer work. Be creative in packaging your skills. While you may think “skills” are limited to techniques learned at the bench, critical thinking and the ability to synthesize information are highly valuable and transferable skills.

For foreign applicants considering a career in the U.S., options might be more limited. Depending on the specific agency, U.S. citizenship could be a requirement. However, opportunities still exist, such as the National Academy of Science Christine Mirzayan Science & Technology Policy Graduate Fellowship.

Finally, fellowships are not all equal. While some may have you working predominately on the Hill, others can provide a more didactic experience. For example, FDA fellowships involve formal course work and the potential for at-the-bench experience. Panelists estimate that upon completion, a third of policy fellows stays in policy, a third returns to academia, and a third enters the private sector.

The panelists' enthusiasm for their careers was evident, as was their conviction of the value of their work. If your interests are varied, you enjoy interacting with people with a variety of backgrounds and you want a novel means to be involved in science, a career in public policy may be well worth considering.

Carolyn Graybeal is a graduate student at Brown University currently working at the NIAAA studying the effects of stress on cognitive flexibility.

Science at the Federal Government: Careers Away from the Bench

Rachel de Kluyver, Ph.D.

The slogan “Uncle Sam needs you!!” is as true today as it was when first used as a military recruiting tool during WWI. It is estimated that the federal government and its agencies need to hire up to 270,000 people between 2010 and 2012 (Partnership for Public Service survey), which represents an outstanding opportunity for Ph.D.s in the public health and medical fields. At the recent NIH Career Symposium, representatives from five federal agencies, including the Public Health Service, the Patent and Trademark Office, the Department of Defense, the Food and Drug Administration and the Department of Health and Human Services, highlighted the diversity of non-bench careers available today.

Expert and generalist positions within the government that require Ph.D. credentials include Scientific Review Officer and Health Science Grants Manager. These roles are involved in all phases of project support from policy development and definition of a funding gap, to oversight of an objective and fair peer review process and finally to post-review project management. Public safety and protection of intellectual property represent the primary mission of Regulatory Scientist and Patent Examiner positions. Patent examiners review patent applications to determine whether a claimed invention meets the “Patentability requirements” for novelty, non-obviousness, utility and sufficiency of disclosure. Many inventions intended for health or medical application are also subject to pre- and post-market safety and effectiveness review by scientists at the FDA.

The panelists stressed the importance of demonstrated competence in the delivery of clear and concise oral and written statements, in efficient time management and in the ability to provide rapid critical analysis. The rewards of federal employment include job security, with excellent health and retirement benefits, coupled with ongoing on-the-job training and development as well as opportunities for international and interagency temporary work placements. In addition federal agencies have access to technology and ideas that are at the cutting edge. Taken together these benefits, combined with a team orientated work environment, provide a high degree of career satisfaction, which can be both personally and professionally rewarding.

In response to questions from the floor, Joshua Levin, Ph.D. and Rob Lyerla, Ph.D. addressed some of the popular myths surrounding federal employment. For example, federal employees are permitted, even encouraged, to publish original findings in peer-reviewed journals. The culture within basic research institutions and government agencies are fundamentally different. Basic research is largely a solitary activity whereby progress is determined by how hard (or smart) one works. In contrast, progress and performance within federal agencies is assessed on a team basis where others rely on you to provide a specific piece of a much larger and more complex puzzle. Adjusting to this new culture can be the most difficult aspect of a transition into public service.

Governing is far more complicated than an outsider imagines, and doctoral training in the physical and biological sciences provides the necessary skills, experience and knowledge to make a positive impact. If you are interested in serving your country and using your expertise in science to improve our society, consider a career in the federal family where you can be part of the solution.

Further information and federal job openings can be found at http://www.uspto.gov (US Patent and Trademark Office); http://jobs.nih.gov (NIH jobs) and http://www.usajobs.gov (federal job and application information).

Rachel de Kluyver Ph.D. is a second year visiting post-doctoral fellow in the laboratory of Dr. Tom Sayers, Molecular Immunotherapy Group at NCI-Frederick. Her current research is focused on identification and targeting of the cancer stem cell compartment for immune-mediated apoptosis and use of biological response modifiers for cancer therapy.

Careers Guiding the Direction of Scientific Research **Kathryn Stein, Ph.D**

Della Hann, Ph.D., Acting Deputy Director of the Office of Extramural Research in the NIH Office of the Director, summed up a career in science policy in one word: information. The four panelists in the session on *Guiding the Direction of Scientific Research* gather, analyze, condense, and communicate information to influence science policy in organizations large and small, public and private. Dr. Hann detailed three qualities essential for fellows seeking a career in science policy. First, the individual should enjoy making connections between laboratory research and the larger scientific stage. Second, he or she should be comfortable relating to the perspectives of different types of people: patient, clinician, legislator, or scientist. Third, he or she must be content with a behind-the-scenes role in shaping policy. The responsibility of a policy officer is not to make decisions, but to provide information to the people who do.

What can a postdoctoral fellow do to prepare for a policy career? Fellows will be pleased to learn that training at NIH translates into an impressive scientific credential in the policy world. However, scientific knowledge is only one facet of a public policy career. Another way to intellectually prepare for a job directing science policy is to read widely in order to cultivate a broad range of interests, both scientific and political.

The panelists also discussed non-scientific skills relevant to a career in policy. First, communication skills are vital. The panelists encouraged fellows to develop their writing portfolio, emphasizing that most jobs will require a writing sample that has not been significantly edited or peer reviewed. This might mean a small article for an NIH publication, a blog post, or an unpublished essay written expressly for the job search process. Bobbie Ann Austin, Ph.D., Assistant Director of Science Policy and Programs for the Association for Research in Vision and Ophthalmology (ARVO), emphasized that communication, both written and oral, is indispensable for her job. At ARVO she combines traditional policy work with other aspects of scientific direction such as communicating with the press, scientists, and lay people as well as acting as the program officer for incoming grant applications.

Another theme stressed by the panelists was flexibility. Michael Stebbins, Ph.D., Assistant Director for Biotechnology at the White House Office of Science and Technology Policy, joked that one of the greatest transferable skills of a bench scientist is “knowing how to fail”. The ability to process failure and quickly regroup without becoming discouraged demonstrates flexibility. In the same vein, Dr. Hann and Rasika Kalamegham, Ph.D., Science Policy Analyst at Friends of Cancer Research, emphasized the rapidly changing nature of their work environment and the need to think and complete tasks under pressure to meet deadlines.

Last, it is important to gain policy experience. Dr. Kalamegham suggested that a great way to obtain policy experience is to get involved in your community, local government, or in your institute within NIH. She cited her own experience lobbying for a community dog park and establishing an NIDDK Fellows newsletter. Alterative ways to gain policy experience include volunteering opportunities at scientific associations or advocacy groups.

Opportunities are more limited for fellows interested in pursuing science policy outside of the Washington, D.C. area. The best places to look for positions are universities, which usually have policy offices, and think tanks, typically located in larger metropolitan areas.

For a scientist interested shaping in the future of science, a career in science policy, guiding the direction of scientific research, is a dynamic and exciting path.

Kathryn Stein is a postdoctoral fellow in NIDDK, where she studies fertilization and the early cell divisions of the nematode, C. elegans.

Careers in Nonprofit Organizations **Jennifer Huang, Ph.D.**

What does a Ph.D. do in a nonprofit organization? Five panelists with very different jobs provided their perspectives on this question for a room full of fellows. Sonal S. Das, Ph.D., the Associate Director for Research Programs at the Michael J. Fox Foundation, manages grant programs as well as organizing meetings and development programs. India Hook-Barnard, Ph.D., a Program Officer and study director with the National Academies of Science, described her job as developing a plan to answer questions asked by members of the government and then recruiting experts to address these questions. Catherine Oliveros, Dr.P.H., a community health specialist at Susan G. Komen for the Cure, helps determine how to target funding within each community so that it will have the greatest impact. Maryrose Franko, Ph.D., a Senior Program Officer at the Howard Hughes Medical Institute, manages graduate and institutional grant programs. Sean Sanders, Ph.D., Commercial Editor with the American Association for the Advancement of Science, is responsible for commissioning articles for Science magazine on science careers and technology.

What can postdoctoral fellows do to prepare for one of these varied careers in nonprofit organizations? As Dr. Das explained, the good news is that postdoctoral fellows already possess most of the skills needed to succeed in careers in nonprofit organizations including intellectual curiosity, critical thinking, and the ability to quickly absorb large amounts of information. The ability to effectively communicate science to a non-technical audience is also extremely important in these positions.

One important skill that postdoctoral fellows may not have experience with is management, but this can be learned. Dr. Hook-Barnard and Dr. Sanders suggested that observing your supervisors and mentoring undergraduates help develop management skills. Volunteering with scientific societies or on committees within NIH is a good way to practice interpersonal and organizational skills.

OK! This nonprofit thing sounds like a good gig. How do I find one? Finding a position at a nonprofit organization may require more creativity in the job search than finding a traditional research job. The speakers gave a few suggestions on ways to direct the job search, and discouraged fellows from adopting a shotgun approach. Dr. Oliveros suggested searching job boards that specialize in nonprofit postings as well as the websites of specific organizations. One piece of advice that was reiterated is the importance of building a professional network that will support you in your transition. Dr. Franko also emphasized informational interviews as a way to gain further insight into what nonprofit organizations are seeking in a potential employee. In addition, it is important to research each organization carefully so that your cover letter and CV can be tailored for each position.

Overall, working for a nonprofit organization can be an exciting career; one that the panelists agreed brings new challenges each day. So if you're planning a career away from the bench, consider including work for a nonprofit organization on your list of options.

Jennifer Huang is a postdoctoral fellow in the NCI CCR Dermatology Branch. She received her Ph.D. from Louisiana State University.

Communicating Science: Careers in Public Relations, Communications, Writing and Editing **Adam Kuszak, Ph.D.**

Sharing an enthusiasm for science discovery and a passion for communicating these advancements to both professional colleagues and lay audiences, the speakers on the *Communicating Science* panel were drawn to careers in scientific and medical writing. The panelists represented diverse careers under the broad umbrella of science writing. Lucilia Pereira Mouriès, Ph.D. works locally in the D.C. area as an independent consultant and biomedical communications specialist. Brian Pittner, Ph.D. serves as a Medical Science Liaison at Spectrum Pharmaceuticals, writing regulatory documents and facilitating communication between scientists and clinicians. Abby Vogel, Ph.D. is a Communications Officer at the Georgia Institute of Technology, reporting on the Institutes' scientific discoveries. An Associate Editor of Molecular Cell, Brian Plosky, Ph.D. critically assesses manuscript submissions and is responsible for communications between authors and the journal.

The panelists did not follow a "standard" path to their respective positions, and serendipity often played a role. Yet they agreed on skills vital to success in science writing. Beyond the obvious need to be an excellent communicator, both in writing and speaking, each speaker emphasized the ability to critically analyze scientific research. They must routinely identify a study's salient findings and understand both its merits and faults. The importance of scientific insight and perspective, in other words the ability to "foresee the implications of scientific discovery," is a necessary skill to engage and inform a target audience. These skills are cultivated during the pursuit of a doctoral degree, thus graduate students and postdocs are well positioned to enter the world of scientific writing. Dr. Mouriès further noted that an advanced degree demonstrates an authority in communicating with scientists, and Dr. Vogel agreed with its power of "instant credibility."

While training for a doctorate provides an excellent foundation for science writing, there are several avenues to gain experience specific to writing careers within the NIH community, which is ideal for those who have limited time away from the bench. Participation in journal clubs and seminars is an excellent way to increase your knowledge base in multiple fields, which is important for writing authoritatively on many topics beyond your specialized research area. Dr. Mouriès spoke highly of her experience on the NIH Fellows Editorial Board (http://ccr.cancer.gov/careers/FEB/). Finally, pursuit of free-lancing opportunities for publications at the NIH and local universities as well as reporting on conferences for professional societies can help build a portfolio.

For those who want to specifically prepare for a science communication career, the speakers recommended internships and workshops. The AAAS Mass Media Science and Engineering Fellows Program (www.aaas.org/programs/education/MassMedia), an internship designed to enhance media coverage of medical science, proved invaluable to Dr. Vogel. Professional

organizations such as the American Medical Writers Association (www.amwa.org) and the National Association of Science Writers (www.nasw.org) offer extensive information to aid science writers in improving their craft and finding employment. Workshops and certificate programs, such as those available through AMWA, are excellent ways to obtain additional training. However, although clearly beneficial, the speakers felt these programs are not absolute requirements for their careers.

The speaker's enthusiasm was striking, confirming a 94% career satisfaction rate (2007 AMWA Salary Survey). Science writers are in a unique position to advance scientific discoveries, bridging the gap between researchers and politicians, regulatory boards, the media, and general lay audiences. Science writers are therefore often in the position of science advocate. The panelists embrace this role, finding satisfaction in communicating the forefront of discovery, promoting scientific progress and helping to shape its future. If you have a passion and knack for relaying scientific discovery to any audience, then take advantage of the many opportunities at your fingertips to investigate a career in science communication.

Adam Kuszak is an IRTA Postdoctoral Fellow in the laboratory of Dr. Susan Buchanan in the National Institute of Diabetes and Digestive and Kidney Diseases. His postdoctoral research studies the structural mechanisms of mitochondrial protein transport and membrane insertion. Dr. Kuszak received his doctoral degree at the University of Michigan, where he studied the molecular pharmacology of the mu opioid receptor.