Letter from the Editors

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The editors of Phi Psi are pleased to present another themed newsletter to our readers. This issue covers the important topic of women in physician-scientist careers.

We cover this subject from a variety of perspectives. In a guest article contributed by the American Women’s Medical Association, the authors describe challenges faced by women in academia. They write about attrition rates among women in the tenure track and describe innovative approaches to encourage women to stay in academic medicine.

Another article, written by Elspeth Hill and James Giles, uses the fascinating concept of “perception of fit” to describe why different medical specialties have different levels of gender disparity. They also discuss the importance of role models in the development of female physician-scientists.

Evan Noch has compiled a list of grant and scholarship opportunities which are available to female physician-scientists in the United States and beyond. We hope that this list will serve as a valuable resource to those seeking funding for their studies.

Daniel Matson reviews The Physician Scientist’s Career Guide, a new book which is meant to act as a vital reference for physician scientists in all stages of their career.

Finally, Hung Doan describes the career of Harold Varmus, one of the four Nobel Laureates who will be speaking at APSA’s 7th Annual Meeting to be held this April. Although our readers are likely familiar with Dr. Varmus's monumental scientific contributions, they may be surprised and inspired by his wide variety of leadership roles in the Federal Government.

As always, the editors of Phi Psi can be reached through daniel_matson@physicianscientists.org. We appreciate any comments, questions or theme ideas which you would like to share. Thank you for reading Phi Psi. We hope you enjoy this issue!
Physician Scientist Spotlight: Harold Varmus
Hung Doan, The University of Texas Medical Branch, Galveston, TX

As a preview for this Spring’s 2011 APSA Annual Meeting, we are highlighting the distinguished career of one of the keynote speakers, Dr. Harold Varmus, Nobel Prize-winning cell biologist and cancer researcher whose pioneering work on Rous Sarcoma Virus opened our eyes to cancer cell biology.

Dr. Harold E. Varmus attended Amherst College in 1957 pursuing literature and further continuing with graduate studies in literature under a Woodrow Wilson Fellowship for one year at Harvard. It was during this time that the young Varmus still felt the tug of clinical medicine and decided to apply and attend the Columbia College of Physicians and Surgeons the following year with an initial interest in psychiatry.

After graduating from medical school, Dr. Varmus served as a House Officer at Columbia-Presbyterian from 1966-1968 and ultimately joined the Public Health Service at the U.S. National Institutes of Health as a clinical research fellow in the laboratory of Dr. Ira Pastan. There, Dr. Varmus studied cyclic-AMP mediated transcriptional regulation of the lac operon genes using DNA/RNA hybridization studies in bacteria. The methodologies from these studies would later set the stage for Dr. Varmus’ future work on retroviral-mediated oncogenesis.

In 1970, Dr. Varmus pursued further postdoctoral training in tumor virology with future Nobel co-laureate J. Michael Bishop, PhD at the University of California, San Francisco. The scientists set out to understand the genetic basis of cancer, addressing such perplexing questions as susceptibility given similar environmental conditions, inheritability of disease, and age-associated prevalence of cancer.

Dr. Varmus studied the life cycle of oncogenic retroviruses; while employing the very techniques he acquired during his time at the NIH, Varmus was able to show that some of the genetic elements that tumor-causing retroviruses injected into cells were in fact cancer-causing (proto)oncogenes. Furthermore, Dr. Varmus argued that these “virogenes” were in fact cognates to normal-functioning cellular genes arising during an evolutionary event termed viral transduction; and in fact these genes encoded normal functional proteins necessary to the cell’s survival.

In his seminal studies, Varmus and colleagues showed that a unique genetic element that is missing in mutant RSV which cannot transform cells (but is replication-competent) was in fact the Src proto-oncogene. This groundbreaking work promoted the idea that cancer arises from mutations of normal genetic elements which can activate proto-oncogenes (c.f. the inactivation of tumor suppressor genes aspect of cancer cell biology as put forth by Knudson’s study on retinoblastoma).

Because of these influential early studies and his essential discovery of proto-

Daniel Matson, University of Virginia School of Medicine

There are many paths to success as a physician scientist, and a greater number of important lessons to be learned along the way. Despite the fact that physician scientists have risen to prominence across academia, industry, and government, getting direct, candid, and experienced advice on navigating this career path is frequently difficult. Thankfully, this has changed with the publication of The Physician Scientist’s Career Guide by Dr. Mark Eisenberg. This book is a must-read for physician scientist trainees, junior faculty members, and students wondering whether they should pursue a career as a physician scientist.

Dr. Mark Eisenberg draws from personal experience and a wealth of knowledge in laying out this book. The piece is separated by training stages, starting with the point at which a student asks themselves if the physician scientist career is something they are interested in pursuing. From this point onward, through training, the first faculty appointment, and even into senior research roles, Dr. Eisenberg lays out the important steps readers should take to help push themselves towards success. He also describes frequent pitfalls at each stage, offers personal advice and stories, and frequently gives simple point-by-point descriptions of (for instance) how to go about finding funding, writing grants, and picking the right projects for your career stage. The big topics (like ensuring you get a good start-up package for your first faculty appointment)

(See Guide on Page 5)
The last hundred years have seen major changes in the medical workforce. In the UK, women now account for more than half of all medical graduates. This has seen corresponding rises in the number of women holding senior positions in the profession almost across the board, with a few notable exceptions, including academic medicine: female professors of medicine remain few and far between.

It has been suggested that female medical students assign higher importance to issues surrounding work-life balance, and compatibility with family life; however, this is a point of contention between researchers in the field. It has also been suggested that women in male-dominated specialties, such as surgery, find it more difficult to establish their identity due to a lack of role models and the engrained cultural discourses and behaviors associated with being a surgeon.

‘Perception of fit’ is a concept used to describe how similar an individual’s personal identity (who they think they are) fits in with their professional identity (who they think academics/surgeons are). Female surgical trainees’ perception of their own fit, when compared to consultant (attending) surgeons, is significantly less than their male counterparts. Interestingly, the further they progress in their training, the more the male trainees’ perception of fit increases, while the females’ decreases.

An increase in the numbers of medically qualified women poses some interesting changes to the way we train doctors. Some specialties are seen as far more female-friendly than others, with over 50% of consultant (attending) pediatricians in the UK and US being female, and the majority of family medicine practitioners; however, a few specialties are still not attracting females. Yet there are no structural or institutional barriers, with women as likely to succeed in being appointed as their male counterparts. It is more an issue of perceived barriers. Role modeling has been shown to be extremely important, for example. Therefore a lack of visible female role models may be detrimental to attracting women into traditionally male dominated fields.

Parallels can be drawn between academic medical science and a variety of stereotypically competitive and male disciplines. Examples include law, math, business and politics. Despite the elimination of structural and legal barriers to the advancement of female careers, women continue to opt out of careers in traditionally male domains. The academic physicians of the world are being picked from an ever-decreasing pool of male medics. If aspiring female physician-scientists continue to be discouraged, academic medicine may be losing out on many of its future stars.

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Much attention has been paid over the past few years to the continued underrepresentation of female physician-scientists and female MDs in academia. It is encouraging to see that for several years now, women have made up 50% of applicants to MD programs and 50% of applicants to PhD programs. Unfortunately, women are still less likely to apply to and enter combined MD-PhD programs, comprising only about 40% of applicants. What is more, a recent study looking at characteristics of graduates from U.S. allopathic medical schools from 2000-2006 found that women who matriculated into combined MD-PhD programs were significantly less likely than their male colleagues to graduate from the program. Presumably, women find physician-scientist careers much less appealing than do men. Previous studies have cited 3 primary reasons why this is the case. First, there is the ever-present concern that it is impossible for a woman to truly balance a successful career with children and family life. Women in medicine already feel limited in their choice of specialty, often choosing certain specialties because of the length of residency and perceived control over scheduling. To many female physicians in training, an additional 4+ years would definitely mean putting a personal and family life on hold.

A lack of mentors and role models is also commonly cited as contributing to an unequal number of women applying to and completing MD-PhD programs. Young women are more often shown the difficulties of being a woman in academic medicine, the challenges faced in obtaining equal salaries and resources, while much less frequently do they see the highly successful female physician-scientist eloquently able to balance career and family. In fact, students matriculating through either MD or combined programs are hard pressed to even find prominent female faculty with women comprising only approximately 34% of medical school faculty. Of those 34%, 40% are assistant professors, 29% are associate professors, and only 17% are full professors. This lack of visible mentors to provide guidance and help navigate the way might be a major contributing factor to the high attrition rate among female MD-PhD program students. Perhaps the most crucial thing that senior women physician-scientists provide is proof that it can be done.

The third reason commonly discussed as propelling this problem is the belief among women that they must consistently compete with and be better than their male colleagues to be considered equal. The thought of working twice as hard for an equal amount of recognition would deter anyone. While most programs and individuals do not actively and openly discriminate against women, numerous studies have shown that we all possess inherent biases, which unfortunately lead to inequalities.

Although the reasons for women opting out of physician-scientist careers have remained unchanged over the past several decades, it is encouraging to see that many physician-scientist training programs and universities have acknowledged that a problem exists. Some programs have begun implementing positive changes, such as increasing the number of part-time faculty appointments, altering the tenure track for new parents and granting paid leave to faculty who are the primary caregiver of new children. Professional organizations such as APSA and AMWA continue to call attention to the gender discrepancy in academic medicine and work to provide networks for young physician-scientists. Looking ahead, it seems that the biggest gains will be made when all members of our profession take responsibility for the current deficit of women in academic medicine. We must make serious efforts to identify the areas of inequality in our institutions and all seek to identify solutions. After all, as physicians what are we if not problem-solvers?

**AMWA and APSA are partnering up!**

To learn more visit [www.amwa-doc.org](http://www.amwa-doc.org)

*The American Medical Women’s Association (AMWA) is excited about working with APSA to assist and empower female physician-scientists. Established in 1915, AMWA still remains the largest international organization dedicated to improving women’s health and advancing women in medicine.*
Varmus (cont.)

oncogenes, Drs. Varmus and Bishop received the 1989 Nobel Prize in Physiology or Medicine.

However, Dr. Varmus’ prominent career did not end with the Nobel Prize. In 1993, he was appointed as the Director of the NIH. It was under his directorship that the NIH budget was doubled, NIH-wide seminars and symposia to celebrate scientific achievement were increased, and the nation’s commitment to basic science research was solidified. This commitment was epitomized in a New York Times editorial where he wrote that, “the most effective long-term approach to improving health lies in fostering the research that increases understanding of genes and tissues.”

In 1999, Dr. Varmus accepted a position as the President and CEO of the Memorial Sloan-Kettering Cancer Center allowing him to continue his research program in cancer genetics. In 2001, Dr. Varmus received the National Medal of Science, the nation’s highest honor for scientists and investigators as well as the Vannevar Bush Award from the National Science Foundation.

Additionally, Dr. Varmus served as co-chair of President Obama’s Council of Advisors on Science and Technology and as of July 12, 2010 serves as the Director of the National Cancer Institute at a crucial point in that Institute’s progress on understanding cancer genomes and assimilating the vast knowledge and information garnered about human cancers.

APSA is excited and privileged to be able to host Dr. Varmus as well as other distinguished scientists and physicians at the 2011 APSA Annual Meeting. We look forward to many fruitful discussions with him and our other prominent guests.

Guide (cont.)

are covered, and so are the smaller details that will make your life easier (like how and when to delegate). When should you choose to go on sabbatical? What about relationships with the pharmaceutical industry? Where should I look for good lab technicians? How long do I have to get funding after I start my lab? What if I have to fire somebody? This book was written to address questions like these and much more.

The author clearly put a great deal of thought into how best to organize this book and it shows. Despite being essentially a reference, the writing will remind you of a conversation with your favorite mentor. Each section of the book leads with an introduction and finishes with a summary, including a bulleted list of the most important points and followed by a list for further reading on that particular career stage. Aside from the sections that focus on career stages, the end of the book contains advice on other matters, like balancing personal life and career, the attrition of physician scientists during training, and issues facing women in particular. The author also describes how he would go about changing the climate for physician scientists, which is certainly interesting from a policy standpoint. The bottom line is that the text is information-dense but not tiring to read. Dr. Eisenberg is also very candid regarding his personal experiences, and this complements the writing a great deal.

Since Dr. Eisenberg works at an academic medical center (like most practicing physician scientists), the book is very specific to the academic arena. If you are looking for a guide to succeeding in industry or government positions, you may be a little disappointed. In The Physician Scientists Career Guide, Dr. Eisenberg offers his personal experiences and advice written into an easy-to-understand, organized, and highly informative reference. The book is written for physician scientists by a physician scientist, and if you are currently a trainee, junior faculty member, or a student considering this career, the book comes with my highest recommendation.
Funding Resources for Women in Science and Medicine
Evan Noch, Temple University School of Medicine

Online Funding Resources:

NSF (Many funding opportunities for women in every stage in their careers)
http://www.nsf.gov

ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers (ADVANCE)
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5383

AAAS (Funding for international research for women)
http://www.aaas.org/programs/international/wist/fundwomen.shtml

Association for Women in Science (AWIS)
http://awis.org/displaycommon.cfm?an=1&subarticlenbr=69

Scholarship Opportunities:

American Society for Microbiology's (ASM) Awards
Over 20 awards that honor scientists in research, education, and service at every career and educational level. Women are eligible and encouraged to apply for all of them. Visit www.asm.org for more information.

M. Hildred Blewett Scholarship
Due Date: June, annually
Amount: up to $45,000
To enable early-career women to return to physics research careers after having had to interrupt those careers for family reasons. The scholarship consists of a one-year award (applicants can apply in a subsequent year for one additional year of support). Allowed expenses include dependent care (limited to 50% of the award), salary, travel, equipment, and tuition and fees.

Alice T. Schafer Prize Association for Women in Mathematics
Due Date: October 1, annually
The Alice T. Schafer Prize is awarded to an undergraduate woman in recognition of excellence in mathematics and is sponsored by the Association for Women in Mathematics (AWM). The criteria for selection include, but are not limited to, the quality of the nominees' performance in mathematics courses and special programs, exhibition of real interest in mathematics, ability to do independent work, and if applicable, performance in mathematical competitions.

ACS Award in Pure Chemistry
Due Date: November 1, annually
Amount: $5,000
Award to recognize and encourage fundamental research in pure chemistry carried out in North America. The award consists of $5,000 and a certificate. Up to $1,000 for travel expenses to the meeting at which the award will be presented will be reimbursed. A nominee must have been born after April 30, 1974 and must have accomplished research of unusual merit for an individual on the threshold of her or his career. Special consideration is given to independence of thought and originality in the research, which must have been carried out in North America.

MAA Grants for Women in Mathematics Projects
Due Date: February, annually
Amount: $6,000
The MAA plans to award grants for projects designed to encourage college and university women or high school and middle school girls to study mathematics. The Tensor Foundation, working through the MAA, is soliciting college, university and secondary mathematics faculty (in conjunction with college or university faculty) and their departments and institutions to submit proposals. Projects may replicate existing successful projects, adapt components of such projects, or be innovative.

American Physical Society Maria Goeppert Mayer Award
Due Date: July 1
Amount: $2,500 plus $4,000 for travel
Awarded to a woman physicist early in her career, this award consists of $2,500, plus a $4,000 travel allowance to present her achievements through lectures.
http://www.aps.org/programs/honors/awards/goeppert-mayer.cfm

American Association of University Women
Due Date: December 1
Amount: $18,000 to $30,000
Offers an International Fellowship which supports women who are non-US citizens. The fellowship offers from $18,000 to $30,000, depending on the educational level of the applicant. It funds either the studies or research of the recipient. The fellowship is to be completed in the US, and upon completion, she is to return to her home country to hopefully use the experience to invoke change the lives of women there, either by teaching or applying knowledge to society.
http://www.aauw.org/fga/fellowships_grants/ifcriteria.cfm

(See Scholarships on Page 6)
Scholarships (cont.)

**Sigma Delta/Epsilon/Graduate Women in Science Fellowship**

**Due Date:** January 15  
**Amount:** Up to $4,000  
*Offers up to $4000 to women pursuing a career in scientific research domestically and abroad. The overall purpose of this fellowship is to increase the fundamental knowledge of sciences, and increase the visibility of women with careers in scientific research. The funds are to be used for small research equipment or for traveling to form collaborations with other scientists. The applicants must be SDE/GWIS members; applicants are able to pay membership fees upon submission of the application. [http://www.gwis.org/programs.html](http://www.gwis.org/programs.html)*

**International Federation of University Women**

**Due Date:** August-September  
**Amount:** $8,500 to $10,500  
*Offers a fellowship for women who wish to study or perform research in countries outside their own or in the country where they complete their studies. There are about 16-25 grants and fellowships offered in each round of competition, each varying in amount. This fellowship does not have a specific science and technology focus. [http://www.ifuw.org/fellowships/international.htm](http://www.ifuw.org/fellowships/international.htm)*

President (cont.)

...the expansion of this critical funding mechanism. We were all excited to hear the wonderful news about the expansion of F30 predoctoral funding ([NCI initiates F30 Support](http://www.niaid.nih.gov/ncif30/index.htm)) and would like to sincerely thank the NIH for their investment in this critical program. However, APSA will continue to focus on highlighting the need to increase the number of institutes that support the F30. To highlight this, please consider participating in our F30 survey and you will be eligible for a $50 Amazon gift card. The data generated from this survey will be used to highlight the importance of this grant for physician scientist trainees.

Lastly, as my term as President ends in a few month, I would like to thank all of you for giving me the humbling opportunity to serve you over the past year. It has been a pleasure to meet with many of you and discuss the needs of our membership and the future of physician scientist trainees. At the same time, I am excited to see the direction in which our organization moves as Eve Geneva, our current president-elect, takes over the role of President. Under her capable leadership, I am certain that APSA will provide additional resources and support for our members. In order to help in this transition, consider joining Eve by applying for a leadership position on next year’s Executive Council. Please visit [here](http://www.niaid.nih.gov/ncif30/index.htm) to learn more about the opportunities that are available to you and consider applying for a position. It is only by taking a role within the organization that we can continue to grow and address the needs of tomorrow’s physician scientists. ■

Can't make it to this year’s National APSA Meeting?  

Save the date for 2012!  

8th Annual APSA Meeting  
April 27—29, 2012  
Chicago, Illinois