Careers in Science Policy

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Research!Louisville
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WHAT DO YOU MEAN YOU HAVE DOUBTS ABOUT BECOMING A PROFESSOR?

SURELY YOU'VE BEEN IN GRAD SCHOOL ALL THIS TIME BECAUSE YOU ASPIRE TO BE JUST LIKE ME?

UH...

HA HA, DON'T ANSWER THAT. I'M JUST KIDDING...

OH. HA HA...

OF COURSE YOU ASPIRE TO BE ME. WHY ELSE WOULD YOU FOLLOW MY EVERY WORD?

IT DOESN'T MAKE SENSE OTHERWISE, DOES IT?

www.phdcomics.com
First, about me…

- **Ph.D., Anatomical Sciences and Neurobiology**
  - University of Louisville School of Medicine
  - *Cytokine Genetics and Expression: Implications of an Immunogenetic Pathogenesis in Autism Spectrum Disorders*

- **Postdoctoral Fellow, Molecular Physiology**
  - National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism
  - NIH Fellows Association NIAAA Representative
    - *Co-chair*: Career Development Committee
    - *Co-chair*: Science Policy Discussion Group
  - *Intern* NIH Office of Research on Women’s Health

- **Science & Technology Policy Fellow**
  - National Academy of Sciences
  - American Association for the Advancement of Science (AAAS)
Today’s Overview

• Nontraditional Careers
  – Evolving Trends
  – Developing Initiatives

• Science Policy
  – Fellowships
  – Jobs at NIH

• General Advice

• Recommended Resources
Ph.D. Trends

Number of Ph.D.s

Year of Ph.D.


- Biochemistry
- Engineering
- Health Sciences
- Immunology
- Molecular Biology
- Neuroscience
- Physical Sciences
- Psychology
### Fields of Study Reported by Trainees and Fellows Earning Ph.D.s in 2013

<table>
<thead>
<tr>
<th>Fields of Study</th>
<th>Number of PhDs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biological/Biomedical Sciences</strong></td>
<td></td>
</tr>
<tr>
<td>Neurosciences</td>
<td>2,246</td>
</tr>
<tr>
<td>Immunology</td>
<td>440</td>
</tr>
<tr>
<td>Molecular Biology</td>
<td>202</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>183</td>
</tr>
<tr>
<td>Genetics</td>
<td>158</td>
</tr>
<tr>
<td>Health Sciences</td>
<td>153</td>
</tr>
<tr>
<td>Engineering</td>
<td>278</td>
</tr>
<tr>
<td>Psychology</td>
<td>215</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>196</td>
</tr>
<tr>
<td>Other</td>
<td>136</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>101</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,172</td>
</tr>
</tbody>
</table>

**Note:** NIH support includes the following award mechanisms: T15, T32, T35, T90, TL1, TU2, F30, F31, and F32.
Doctoral degrees

The disposable academic

Why doing a PhD is often a waste of time

Dec 16th 2010 | From the print edition

The Myth of the Science and Engineering Shortage

American students need to improve in math and science—but not because there's a surplus of jobs in those fields.

MICHAEL S. TEITELBAUM | MAR 19 2014, 7:46 AM ET
Post-Ph.D. Plans of Trainees and Fellows, 1983-2013

- Definite Plans for a Postdoc
- Indefinite/Unknown Plans
- Definite Plans for a Job
- Other

Year of Ph.D.

Percentage of Ph.D.s
Mismatch of Supply and Demand

- **Doubling of NIH budget** fueled expansion followed by slowdown
- Malthusian traditions: Most scientists train more people than needed to replace themselves
- Hyper-competition: Low success rates breed conservative science, feed fads for translation and overstated results, and lead to irrational overvaluing of high impact journals

"The training pipeline produces more scientists than relevant positions in academia, government, and the private sector are capable of absorbing."
Snapshot of the PhD Biomedical Research Workforce

NOTE: The color of the numbers reflects the confidence in the accuracy of the data.

Of graduates who stay in the US
30% skip a postdoc
70% do a postdoc

Graduate Education & Training
- 2009 Total: 83,000
- Time to Degree: 5.5-7 yrs
- 2009 Graduates: 9,000

International
- 4,000 in 2009
- 8% of graduates leave the US

Postdoctoral Training
- 2009 Total: 37,000 to 68,000
- Median Length: 4 years

1,900 to 3,900 in 2009

Post-Training Workforce
- (128,000 Biomedical US-trained PhDs)

- Science Related Non-Research
  - 18% Biomedical US-trained PhD 2008
  - ~24,000

- Government Research
  - 6% Biomedical US-trained PhD 2008
  - ~7,000

- Academic Research or Teaching
  - 43% (23% tenured Biomedical US-trained PhD 2008)
  - ~55,000

- Industrial Research
  - 18% Biomedical US-trained PhD 2008
  - ~22,500

- Non-Science Related
  - 13% Biomedical US-trained PhD 2008
  - ~17,000

- Unemployed
  - 2% Biomedical US-trained PhD 2008
  - ~2,500
• **Broadening Experiences in Scientific Training (BEST) Awards**
  - 5-yr, 1-time grants
  - 17 awardee institutions:
    - Cornell
    - Emory
    - NYU
    - UC Davis
    - Virginia Polytechnic
    - UC Irvine
    - University of Colorado
    - Vanderbilt
    - Boston University
    - U Mass
    - Wayne State
    - Michigan State
    - Rutgers University
    - UNC
    - University of Chicago
    - UCSF
    - University of Rochester

http://www.nihbest.org/
Figure A: Career Outcomes for Traditional Model of Graduate Education

- PhD
- Postdoc
- Academia
- Industry/Biotechnology

Legend:
- Direct Career Paths
- Indirect Career Paths

Figure B: Career Outcomes for BEST-Enhanced Model of Graduate Education

- PhD
- Postdoc
- Academia
- Other Science Careers
- Law
- Government
- Administration
- Science Policy/Communication

Legend:
- Direct Career Paths
- Indirect Career Paths

Through BEST, additional pathways are provided, enhancing the traditional model.
Career Opportunities

- Science Education & Outreach
- Academia
- Government & Non-profit
- Science Communication & Publishing
- Industry Research
- Business & Commercialization
- Law, Policy, & Regulatory Affairs
- Academic & Research Administration
- Medicine & Healthcare
Transferable Skills

- Critical Thinking
- Problem-solving
- Data Analysis
- Communication
- Management
- Reliability
- Teamwork
- Leadership
- Strong ethics

To develop:
- Volunteer
- Internships
- Fellowships
- Additional Training
- Demonstrated interest in new career path
The National Institutes of Health

There are **27** different Institutes and Centers (ICs) and **24** ICs that award grants.

Each one has:

- Different missions
- Different funding priorities
- Different budgets
- Different types of grants they support
- Different procedures for making funding decisions
- Different funding strategies
Science Policy

• Area of public policy informed by science and technology for the benefit of society

• Policy for Science
  – Establishes guidelines and regulations for conduct of science
  – Sets funding priorities and directions for research
  – Develops STEM educational programs

• Science for Policy
  – Inform the development, decision-making, implementation, and evaluation of policies, programs, and regulations for scientific research
  – Science and technology advisors for Congressmen

• Bridge between policy world and scientists
• Communication skills are key
• Fellowships
Hot Topics in S&T Policy

- Climate change
- Dual use research
- Synthetic biology
- Nanotechnology
- Neuroscience
- Animal research
- Informed consent
- Infectious disease/pandemics
- Training the biomedical workforce
- Energy security and alternatives
- Human subjects research
- Healthcare
“Policy” at NIH

Policy

Program

Communication
Who influences S&T Policy?
Graduate Fellowships

• **Science Policy**
  – STEM Presidential Management Fellows Program
  – The National Academy of Sciences Science & Technology Policy Graduate Fellowship Program
  – American Association for the Advancement of Science (AAAS) Science & Technology Policy Fellowships

• **Science Communication**
  – AAAS Mass Media Science & Engineering Fellows Program
  – National Cancer Institute (NCI) Health Communications Internship Program
• Presidential Management Fellows Program
• Leadership training in public policies and programs at Federal agencies
• Pilot STEM track for fellows to:
  – Manage R&D programs
  – Perform cutting edge R&D
  – Develop technically informed policies
  – Respond to disasters
  – Lead the federal S&T enterprise
AAAS Mass Media Program

- AAAS Mass Media Science & Engineering Fellows Program
- Places undergraduate, graduate and post-graduate science, engineering and math students at media outlets
Six month to 1 year internships at NCI

Tracks: Health communications & Science writing

Plan, develop, and promote cancer education programs and materials (including Web-based) for the public, cancer patients, or health professionals

Gain experience in pre-testing and evaluating cancer prevention and treatment messages, publications, materials, and programs that reach the American public

Participate in professional meetings and training seminars

Applications due in March
• Christine Mirzayan Science & Technology Policy Fellowship Program
• Provides early career individuals with opportunity to learn about science & technology policy at the National Academies
• 12 week program: January-April
• 2017 fellowship session will open to applicants in the summer, due date mid-Sept
• Established in 1970
• **Health** arm of the National Academy of Sciences
• Private, independent, nonprofit organization
• Both an honorific membership and a policy research organization
• >1,700 IOM members; each year up to 65 new members are elected based on their professional achievement

Fostering Discussion and Discovery
• Consensus Studies
• Forums and Roundtables
• Standing Committees
• Workshops
• Symposia and lectures
Forum on Neuroscience and Nervous System Disorders

• **Areas of interest:** Nervous System Disorders, Mental Illness and Addiction, Genetics of Nervous System Disorders, Cognition and Behavior, Modeling and Imaging, and Ethical and Social Issues

• **Membership:** industry, NIH, NSF, foundations, academics, patient groups, and clinicians
Forum on Medical and Public Health Preparedness for Catastrophic Events

- **Areas of interest**: Personal Protective Equipment, Medical Countermeasures, Biosurveillance, Mass Casualty Incidents, Crisis Standards of Care
- **Membership**: CDC, NIH, ASPR, DHS, VA, FDA, FEMA, NACCHO, American Hospital Association, United Health Foundation
AAAS S&T Fellowship Program

- Science & Technology Policy Fellowships
- 7 Fellowship Areas
- Opportunity for accomplished scientists and engineers to contribute to federal policymaking process
- 2015 fellowship session is now open to applicants (Nov 1 due date)
GOAL: Foster scientifically informed, evidence-based policy and practice.

STRATEGY: Engage scientists and engineers from a broad range of disciplines, backgrounds and career stages to:

➢ Contribute knowledge and analytical skills to the federal government

➢ Learn first-hand about policymaking and implementation at the federal level

➢ Build S&T leadership equipped to address complex societal challenges

OUTPUT: Policy-savvy scientists & engineers
Fellowship Areas

- Big Data Analytics
- Congressional
- Energy, Environment & Agriculture
- Diplomacy, Security & Development
- Roger Revelle Fellowship in Global Stewardship
- Health, Education & Human Services
- Judicial Branch
# Science Policy in Government

## Congressional Placements
- Collect and analyze information
- Write: briefs, talking points, speeches, press releases, reports, text for bills, websites
- Meet with stakeholders
- Organize hearings
- Facilitate, negotiate legislation
- Oversight

## Federal Agency Placements
- Collect and analyze information
- Write: briefs, talking points, speeches, press releases, reports, text for regulations, websites
- Meet with stakeholders
- Prep for hearings
- Facilitate, negotiate regulations
- Program development, implementation and evaluation
- Interagency collaborations
2014-15 Placements

Yearlong Fellows (N=279)
2014-2015 AAAS S&T Policy Fellows

286 Year-long Fellows
- 170 first year
- 92 second-year
- 6 short-term extensions

247 Executive Branch Fellows
- 239 selected & administered by AAAS
- 8 selected & administered by partner societies

33 Congressional Fellows
- 2 selected & sponsored by AAAS
- 31 selected & sponsored by partner societies
How Competitive Are the Fellowships?

<table>
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<tr>
<th></th>
<th>APPS</th>
<th>APPS TO SCs</th>
<th>SEMI FINALISTS</th>
<th>INTERVIEWS</th>
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<tr>
<td>EEA</td>
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<td>96</td>
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<td>HEHS</td>
<td>233</td>
<td>117</td>
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<tr>
<td>Cong</td>
<td>85</td>
<td>32</td>
<td>12</td>
<td>12</td>
<td>2</td>
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<tr>
<td>Judicial</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>1</td>
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<td><strong>Total</strong></td>
<td>811</td>
<td>509</td>
<td>305</td>
<td>297</td>
<td><strong>206</strong>*</td>
</tr>
</tbody>
</table>

* includes dual finalists
Alumni Fellows in Government and Academia

**Frances A. Colón**
Deputy Science and Technology Adviser to the Secretary of State, U.S. Department of State

**Arati Prabhakar**
Director, Defense Advanced Research Projects Agency, DoD

**Kevin Michael Foster**
Professor and Executive Director, Institute for Community, University and School Partnerships, UT Austin

**Rosina Bierbaum**
Dean, SNRE, U. Michigan; Member PCAST
Alumni Fellows in Private Sector and Non-Profits

Alice Chen
Scientist, Law Firm of Keller and Heckman

Anish Goel
Director, Technology Policy and Geopolitical Affairs, The Boeing Company

Jessica Tuchman Mathews
President, Carnegie Endowment for International Peace

Steven Buchsbaum
Deputy Director, Discovery at Bill & Melinda Gates Foundation
General Advice

- Evaluate your career goals
- Assess your skills, values & interests
- Talk to a career counselor & research options
- Identify mentors
- Develop an Individual Development Plan (IDP)
  - myIDP.sciencecareers.org
- Gain relevant exposure
- Do Informational Interviews & Network!
- Create a LinkedIn Profile
  - Groups to join:
    - Alternative PhD Careers
    - PhD Careers Outside Academia
Recommended Reading
Career Resources

NIH Office of Intramural Training and Education
https://www.training.nih.gov/

Bio Careers®
The Career Hub for Postgraduate Life Scientists

Science Careers From the journal Science
http://sciencecareers.sciencemag.org/

National Postdoctoral Association
myIDP Individual Development Plan
Thank you!

Email: mottmc@od.nih.gov

what people think it looks like  
what it really looks like
NINDS
Seeking Knowledge about the Brain . . .
Reducing the Burden of Disease