What do PhDs do?

Kim Petrie, PhD
Director of Career Development
Biomedical Research Education and Training
Vanderbilt School of Medicine
Overview

- National PhD workforce data
- Alumni career vignettes (*Beyond the Lab* on VU YouTube)
- Career planning strategies
Survey of Doctorate Recipients

• Primary source of data on PhD workforce in STEM fields
• Conducted every 2 years with a subset of S&E PhDs
• Follows same people from PhD → age 76
Distribution of biomedical PhDs by employment sector

Source: http://sestat.nsf.gov/
## Then and Now: Biomedical PhDs in faculty jobs

<table>
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<tr>
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<th>1973</th>
<th>2012</th>
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<tbody>
<tr>
<td>%</td>
<td>59%</td>
<td>24%</td>
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</table>

**Biomedical Sciences PhDs in Tenure or Tenure-Track (T/TT) Faculty Jobs in Academia**

*Source: NSF Survey of Doctorate Recipients with analyses by FASEB and 2012 NIH Biomedical Workforce Report*
start-ups & entrepreneurship
clinical research
data management
medical communications
journalism
publishing
consulting
patent law
regulatory affairs
technical sales
business development
venture capital
Industry R & D
government administration
nonprofit management
academic administration
defense & intelligence
science policy
technology transfer
science outreach
K-12 education
grants management
2012 biomedical employment by sector

- Academia: 53%
- Industry: 30%
- Government: 9%
- NP: 8%

Source: http://sestat.nsf.gov/
2012 biomedical employment by sector

- Academia: 53%
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- T/TT faculty: 24%
- no rank/staff: 29%

Source: http://sestat.nsf.gov/
Academic faculty career path

TRAINING
- Grad School: 5-6 years, $27K/year
- PhD: 3-5 years, $42-55K

TENURE-TRACK FACULTY CAREER
- Assistant Professor: 7-9 years
- Associate Professor
- Full Professor

Tenure
What is tenure?

- Lifetime appointment at an institution
- Granted on the basis of a faculty member’s contribution to the research, teaching, and service missions of the institution
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Source: http://sestat.nsf.gov/
“Other” roles in academia

- Staff scientist
- Core facility director
- Science journalist
- Science outreach
- Development officer
- Program manager
- Project manager
- Research administration
- Technology transfer

Tom Utley
- PhD in Microbiology & Immunology
- Licensing Analyst, Vanderbilt Center for Technology Transfer and Commercialization

https://www.youtube.com/watch?v=VAst9fi51qU
2012 biomedical employment by sector

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Source: http://sestat.nsf.gov/
Government agencies that conduct research

- NIH
- CDC
- FDA
- EPA
- NASA
- Military
- FBI
- CIA
- 39 federally funded R & D centers
Other government roles

- Program officer
- FDA reviewer
- Scientific review officer
- Patent examiner
- Science policy analyst
- Intelligence analyst

- Erik Prentice
- PhD in Microbiology & Immunology
- Formerly an Analyst with Department Intelligence Agency

https://www.youtube.com/watch?v=D1DaH055Ykg
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Source: http://sestat.nsf.gov/
Research careers in nonprofits

- >80 independent research institutes
- Similar roles as academia/government (faculty/staff roles)
Nonprofit roles

• Researcher at a research institute
• Grants manager
• Program officers
• Scientific directors
• Think tanks
• Intelligence analysts

Amy Moore
• Postdoctoral fellowship in Biochemistry
• Director of Research Programs, Georgia Research Alliance

https://www.youtube.com/watch?v=KeMOQZHAHOY
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Source: http://sestat.nsf.gov/
Functional areas within the life science industry

From Career Opportunities in Biotechnology and Drug Development (Freedman, 2008)
Types of life sciences companies

- Pharmaceutical
- Biotechnology
Drug Discovery Scientist

- Nurrudeen Lewis
- PhD Microbiology & Immunology
- Scientist, Cellular & Translational Immunology Group, EMD Serono
  - https://www.youtube.com/watch?v=V4huVuK4T-Y

(2:03-4:37)
Types of life sciences companies

- Pharmaceutical
- Biotechnology
- Medical Device
- Drug Delivery
- Biotechnology Tools
- Instruments
- Molecular Diagnostics
- Contract Research Organizations
- Agricultural Biotechnology
- Industrial Biotechnology
- Veterinary Products
- Consumer Products
- Bioinformatics
Functional areas within the life science industry

From Career Opportunities in Biotechnology and Drug Development (Freedman, 2008)
PhDs are found in careers throughout industry!
Clinical microbiology laboratory director

- Karissa Culbreath
- PhD Microbiology & Immunology
- Clinical microbiology laboratory director, Tricore Laboratories

https://www.youtube.com/watch?v=lXy4vwFtdG4

(1:48-3:00)
Consultant

- Laura Terry
- PhD Cell & Developmental Biology
- Management Consultant, McKinsey & Company
- https://www.youtube.com/watch?v=7iKy0mDP4kM

(1:12-2:35)
Work for a company that develops products
Work for a contract research organization (CRO) or company that provides a service
Landed this job right out of PhD or postdoctoral training
Gained more education or experience in other areas before moving to this role
CONCLUSION

PhDs pursue diverse careers!
A love of science & learning

Deep understanding of science, the scientific method, and the “scientific enterprise”
These careers also require...

- problem-solving skills
- critical-thinking skills
- creativity
- collaboration skills
- persistence
- objectivity
- ability to influence others
- ability to anticipate and thwart problems
- communication skills
PhD training helps you develop….

• problem-solving skills
• critical-thinking skills
• creativity
• collaboration skills
• persistence
• objectivity
• ability to influence others
• ability to anticipate and thwart problems
• communication skills
WHAT’S NEXT FOR YOU?

Your Career Starts Here
Know yourself

Skills
What do you know how to do?
What are you good at?

Interests
What do you want to do?
What do you enjoy?

Values
What qualities are important to you in a work environment and in your career?

Satisfying career
Explore career options for PhDs

- *Beyond the Lab* videos (https://medschool.vanderbilt.edu/aspire/beyond-lab-video-series)
- AAAS *ScienceCareers* (www.sciencecareers.sciencemag.org)
- “Informational interviewing” (ask people about their work)
  - What is your career journey? How did you get to your current role?
  - What do you do? What do you (dis)like about your job?
  - What are the key qualities that help someone succeed in this job?
  - What advice do you have for someone who wants to pursue a similar job?
- Ask far and wide: friends, family…
- Summer research internship = opportunity for “informational interviewing”
Reasons to get a PhD

Not-so-good

• PhD programs will pay me!
• My folks/profs think I should.
• This is what I always thought I would do.
• I know I can be successful in school.
• There are no jobs for someone with only a BA/BS.
In 2013, there were more BS-level jobs in the life sciences.

Source: The Coalition of State Bioscience Institutes Life Sciences Workforce Trends Report 2014
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## Reasons to get a PhD

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<thead>
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<th>Not-so-good</th>
<th>Good</th>
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<td>• PhD programs will pay me!</td>
<td>• Science is fun: I love the thrill of science, discovery, and lab work.</td>
</tr>
<tr>
<td>• My folks/profs think I should.</td>
<td>• I am driven* to understand how things work.</td>
</tr>
<tr>
<td>• This is what I always thought I would do.</td>
<td>• I want to be a professor or run a research lab.</td>
</tr>
<tr>
<td>• I know I can be successful in school.</td>
<td>• The job I want requires a deep understanding of basic science &amp; research.</td>
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<td></td>
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</table>

*curious ≠ driven
Graduate school is a stepping stone to a career

• When evaluating programs, ask:
  • How long do students take to finish their degree?
  • What do students do when they finish?
  • What do you consider a “successful” career outcome?
  • What career resources are available to PhD students?
  • How do you help students who want to be a professor? Something else?

• How will this PhD program help me get to the next stage of my career?