Some Ongoing Priorities for NIGMS

- Maximizing Investigators’ Research Award (MIRA) Program
  - New FOA coming for established PIs
    - Will support renewals
    - Targeting a high success rate for renewals
    - First renewal applications for previous ESIs will be clustered in review and scored relative to others at the same career stage
  - New FOA coming for Early Stage Investigators (ESIs)
    - Reviewed separately from established investigators in their own panels
    - Want to get ESIs funded earlier!
Some Ongoing Priorities for NIGMS

• Support regional (multi-state) and national research resources
  o Synchrotron beamlines and cryo-EM centers
    • Cryo-EM centers have a focus on training!
      https://commonfund.nih.gov/cryoem
    • New FOAs to support cryo-electron tomography centers (RFA-RM-19-009/010)
  o New FOA to support regional and national resources
    • PAR-19-301
    • These centers will also have a focus on training
Some Ongoing Priorities for NIGMS

• Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) Program
  
  o Don’t leave yet! Alison will discuss this important initiative…

Pathways: A New Collaboration with Scholastic

• Spark student interest in basic biomedical research and careers (grades 6-12)

• Free resources including a student magazine in Scholastic’s “Science World,” lesson plans for teachers, online activities and videos featuring NIGMS scientists and research

• Launched May 18, 2019

• Reached 19,000 teachers and 500,000 students in all 50 states

http://www.scholastic.com/pathways
Biomedical Graduate Education: Calls for Revolution

Rethinking graduate education

A substantial number of PhDs in science in the United States will not have careers in academic research, yet graduate training in science has followed the same basic format for almost 100 years, heavily focused on producing academic researchers. This is not to say that many students will not find their way to the leading edge of the future of science. Many academic, governmental, and professional leaders and organizations have lamented this discrepancy and have suggested substantive changes, but most of these have been minor changes to graduate training offerings. It is time for the scientific and education communities to take a more fundamental look at how graduate education is structured and consider, given the current environment, whether a major reconfiguration of the entire system is needed.

Some relatively new government programs and curriculum supplements are positive steps that are likely to help students gain greater flexibility. For example, the Biomedical Research Workforce Initiative from the U.S. National Institutes of Health supports innovative approaches to help biomedical graduate training better reflect the range of opportunities that students might pursue. In addition to increasing the number of positions available, these efforts are also working on the problem. As one example, the Massachusetts Institute of Technology offers a Global Entrepreneurship Research Program that is designed to help students learn innovation-driven entrepreneurship through hands-on learning experiences with successful entrepreneurs. However, these efforts are limited in scope and primarily take the form of adding offerings to an already crowded curriculum. What is needed is a fundamental system analysis and reconfiguration that results in graduate training programs that are better designed to meet the diverse career needs of today’s students.

The Vision and Change in Undergraduate Biology Education report, which was published in 2003, aimed to address the needs of undergraduate students by advocating for a more student-centered approach to learning. It emphasized the importance of active learning, interdisciplinary approaches, and real-world applications. The report called for a rethinking and reconfiguration of the education system to better prepare students for the 21st century workforce.


days of academic science are over. The system also works for the very best graduate students at the top research universities whose career paths often do not point toward academia, instead, because the current approach has generated one of the strongest academic scientists in the world, there will be an understandable reluctance to follow with similar “no harm while doing good” will have to be a mantra of any system redesign.

This scale of change has been called before, with substantial success, in education. The U.S. National Academy of Engineers, in its 2004 report, “Engineering in the Next Century: A Vision for Education,” recommended that engineering education be restructured to be more relevant to the needs of the 21st century. The report called for a rethinking of the entire system, including a shift from a focus on research to a focus on problem-solving.

For the science students of the future, the PhD system needs a serious rethink.

“A major reconfiguration of the entire system is needed.”

— Alan L. Leshner

Biomedical Research and Postdoctoral Training Conference, Part 2

“Substantial changes in graduate education are recommended—not because the previous approaches were wrong—but because the technological leaders of this century must have skills crafted to meet its demands.”

ADVANCING GRADUATE EDUCATION IN THE CHEMICAL SCIENCES

Summary Report of an ACS Presidential Commission

Submitted to ACS President Bassam Z. Shashashviri

on December 3, 2012

Future Of Bioscience Graduate And Postdoctoral Training Conference, Part 2

NIH National Institute of General Medical Sciences
Much of what I am about to say is relevant to undergraduate and postdoctoral programs as well!
Reform Your Curriculum!

- There are a lot of **new expectations in the FOAs** – e.g., skills development, educational innovation, rigor and reproducibility

- We (and the study sections!) are anticipating that meeting these expectations will require **significant curricular reform efforts** rather than simply adding on a module here and there

- I have been there and know how hard it will be and how much resistance you are likely to face, but now you can say “NIGMS expects us to do this.”
Modern Biomedical Science Requires Strong Quantitative and Computational Skills

- Statistics are important, but there are other quantitative areas that are also important.
- Consider integrating quantitative and computational skills development with the teaching of other material.
- Explore ways to develop quantitative and computational skills in students who are not already comfortable in these areas.
- Look at the NIH Strategic Plan for Data Science:
Socio-Economic Status Is Highly Correlated with College Graduation Rates, but the Gap Shrinks as Quantitative Skills Increase

Percentage of 2002 High School Sophomores who Earned a Bachelor’s Degree or Higher by 2012, by Socio-Economic Status and Mathematics Achievement Quartile
Rigor and Reproducibility and Responsible Conduct of Research

- Not “one-and-done” check boxes
- Should be integrated throughout the didactic and mentored phases of training
- Becoming a rigorous and responsible scientist should be at the heart of everything that happens during student training
Educator-Initiated Innovations

• Training modules to enhance data reproducibility (R25)

- Improving Reproducibility in Research
  - Module 1: Experimental Design Learning Module
    - The Experimental Design Learning Module focuses on the intricacies of designing research that is robust, with an eye towards making it reproducible. It is comprised of four distinct learning units: 1) Replication, 2) Randomization, 3) Pitfalls with Experimental Design, and 4) Measurement. Each of these learning units has one or more sub-topics that is the subject of an individual webisode.
  - Module 2: Analysis/Reporting Learning Module
    - The Analysis/Reporting Learning Module covers the various factors that are critical to writing about research with enough clarity to ensure its reproducibility. Very few researchers are given formal education on how to properly report findings to support reproducibility. It is comprised of three distinct learning units: 1) Power and P-values, 2) Scientific Writing, and 3) The Review Process. Each of these units has one or more sub-topics that are the subject of an individual webisode.

- Let's Experiment: A Guide for Scientists Working at the Bench
  - A 6-week online course designed for students and practitioners of experimental biology. Scientists from a variety of backgrounds give concrete steps and advice to help you build a framework for how to design experiments. We use case studies to make the abstract more tangible. In science, there is often no simple right answer. However, you can develop a general approach to experimental design and understand what you are getting into before you begin.
  - By the end of this course, you will have:
    - A detailed plan for your experiment(s) that you can discuss with a mentor.
    - A flowchart for how to prioritize experiments.
    - A lab notebook template that is so impressively organized, it will make your colleagues envious.
    - A framework for doing rigorous research.

• Administrative supplements for predoctoral T32s
  - Rigor & Reproducibility
  - Career Development
  - Skills Development – technical, operational, professional
  - Safety in the Research Environment

Promoting Safe and Inclusive Environments: What do we mean by safe?

- Safety on campus
- Laboratory safety
- Safe from harassment, abuse & intimidation
- All of the above
Promoting Safe and Inclusive Environments

2:15P – 3:30P  **Equitable, Inclusive and Safe Environments**,  
Panelists: Kim McCall, Ph.D., Boston University; Jason Sheltzer, Ph.D., Cold Spring Harbor Laboratory; Carol B. Muller, Ph.D., Stanford University  
Moderator: Alison Gammie, Ph.D., NIH/NIGMS  
Location: Salon D&E

3:45P – 4:45P  **NIH Policy on Sexual Harassment**, Carrie D. Wolinetz, Ph.D., NIH  
Moderator: Judith Greenberg, Ph.D., NIH/NIGMS  
Location: Salon D&E

4:45P – 5:45P  **Enhancing Laboratory Safety and the Principles of Safe Research**, Craig Merlic, Ph.D., University of California, Los Angeles  
Moderator: Jon Lorsch, Ph.D., NIH/NIGMS  
Location: Salon D&E
Committee members shouldn’t expect Ph.D. students to serve coffee and pastries

By Kate Bredbenner | Jul. 4, 2019, 2:00 PM

1. Cultural “norms” can have significant influences on efforts to promote diversity.
2. A culture of entitlement and elitism in academic science?

• Did no one on the faculty stop to think about the implications of students bringing them coffee and pastries for thesis committees?

• Is the level of “luxury” of prospective graduate student visiting weekends appropriate and wise? (Note: there is a Prisoner’s Dilemma here.)

• Is going to a conference where most of the day is spent skiing or sightseeing a good idea?
3. Is there a connection between entitlement and perceived measures of success?

Perceived measures of success:
- # of R01s
- Size of lab
- “Vanity journal” publications
- Quality and impact of research
- # days travelling (“million miles clubs”)
- Lab(s) in other countries
- Center grants

Years:
How good a mentor will this PI be?

3 R01s, 1 P01, 1 P50
18-person lab
Member of 5 graduate programs
Travels 100+ days a year
Just opened a second lab in another country

From predoctoral T32 FOA: “A mechanism to monitor mentoring, including oversight of the effectiveness of the trainee/program faculty match, and a plan for removing faculty displaying unacceptable mentorship qualities from the training program"
Alison and I will take questions together after her presentation