2018 Broadening Experiences in Scientific Training Annual Meeting

Working Together to Advance Higher Education
Dear Colleagues,

On behalf of the BEST coordinating center, we are pleased to welcome you to Bethesda for the 2018 BEST Annual Meeting: “Working Together to Advance Higher Education.”

At this year’s meeting, we are excited to welcome our colleagues to collaborate on topics related to career activities. We hope by the conclusion of the meeting everyone will have created additional collaborations, as well as learned effective strategies for creating and maintaining career development programs at your institution.

By this time next year, the NIH funding for the BEST initiative will have ended. We would like to thank the NIH and the Office of Strategic Coordination (Common Fund) for their support. After speaking with all 17 institutions, we are pleased to say that the majority of the programming created as a result of this funding will continue into the foreseeable future.

Moving forward we hope to continue to collaborate with each other as well as form new collaborations with other individuals and institutions. We anticipate that we will all come together with the goal of expanding evidence-based approaches for providing useful career development.

We would like to thank the efforts of many dedicated individuals. A special thanks to Tracey Baas and all the members of the Planning Committee who have volunteered their time and effort to ensure a successful meeting. Another thanks to the External Scientific Panel. They have been with us throughout and have provided us with valuable advice as the consortium worked hard to create new programs. Finally, we would like to thank all our panelists for joining us at this year’s meeting; we look forward to hearing their insights about creating and sustaining culture change in academia.

We are excited to interact with everyone over the next couple of days. If at any time during the meeting you have questions, comments, or concerns, feel free to speak with us or anyone on the planning committee.

Many thanks,

Roger Chalkley, D.Phil
BEST Administrative Supplement PI
Senior Associate Dean for Biomedical Research Education and Training, Vanderbilt University

Laura Daniel, Ph.D.
Best Consortium Associate Director

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University of Chicago

Avery August
Cornell University

Beka Layton
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Cynthia Fuhrmann
University of Massachusetts Medical School

Fred Meyers
University of California, Davis

Inge Wefes
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Janet Alder
Rutgers University

Keith Micoli
New York University

Laura Daniel
Vanderbilt University

Roger Chalkley
Vanderbilt University

Tracey Baas (Committee Chair)
University of Rochester

Trish Labosky
National Institutes of Health

Special Thanks to the BEST Meeting Planning Committee
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Wednesday, October 24
Pushing the Needle: Expanding professional development in academia

08:30 – 09:00  Registration
09:00 – 09:10  Welcome: Trish Labosky, Ph.D. and Roger Chalkley, D. Phil.
09:10 – 09:30  Keynote address: P. Kay Lund, Ph.D.

Dr. Lund is the Director of a Division of Biomedical Research Workforce in the Office of Extramural Research at the National Institutes of Health (NIH). The division has responsibilities for policy and extramural programs related to training, career development, and diversity of the biomedical research workforce. Dr. Lund manages, enhances, and evaluates the NIH Research Training and Career Development Programs. She leads efforts to implement recommendations from the Biomedical Research Workforce and Physician Scientist Workforce Working Group.

Dr. Lund serves as co-chair of the NIH Common Fund’s Working Group for the Strengthening the Biomedical Research Workforce program, the origin of the BEST awards geared towards Broadening Experiences in Scientific Training.

Dr. Lund received a bachelor’s degree and a Ph.D. in Physiology from the University of Newcastle upon Tyne. In her academic career she had appointments at the Massachusetts General Hospital, Harvard Medical School, and the University of North Carolina at Chapel Hill. During a long tenure at UNC-Chapel Hill, she mentored a large number of biomedical and physician scientist researchers from students through postdoctorates to faculty. Dr. Lund has published widely in her scientific discipline and has also written articles about broadening definitions of career outcomes for Ph.D. scientists.

09:30 – 10:45  Institutions in Action: Part 1

| Faculty Perceptions and Knowledge of Career Development of Trainees in Biomedical Science: What do we (think we) know? - Stephanie Watts, Michigan State University |
| BEST Consortium Roadshow - Tracey Baas, University of Rochester Medical Center |
| Write Smarter: Feel Better - Melanie Carew, Institution Cooperative Research Centre for Mental Health |
| Developing Professional Skills: Postdoctoral scientific editing and reviewing - Lisa Kozlowski, Thomas Jefferson University |
| Ph.D. Career Ladder Program: A grassroots approach to career development - Kathleen Flint Ehm, Stony Brook University |

Moderator: Janet Alder, Ph.D.

10:45 – 11:00  Break
11:00 – 11:45  Institutions in Action: Part 2

| Hit the Ground Running: A professional development program for post-doctoral scholars - Sharona Gordon, University of Washington |
| Lessons Learned: Obstacles and solutions for developing an effective internship program - Rebekah L. Layton, University of North Carolina at Chapel Hill |
| How Career Development Programming for Graduate Students has Evolved to Satisfy Their Changing Interests and Needs - Jaime Rubin, Columbia University |

Moderator: Janet Alder, Ph.D.

11:45 – 01:15  Lunch - on your own
01:15 – 02:45  Plenary Session: Leveraging Organizational Influence to Support Culture Change in the Academy

Panelists: Tobin Smith, M.P.S., Julia Kent, Ph.D., David Asai, Ph.D., and James Sterling, Ph.D.

Moderator: Cynthia Fuhrmann, Ph.D.
Wednesday, October 24

Pushing the Needle: expanding professional development in academia

02:45 – 03:45  Institutions in Action: Part 3

- Progress Report: Online workshop on building a professional development program - David Fruman, University of California - Irvine
- Planning Your Scientific Journey: Outcomes from an online professional development course - Shannon Behrman, iBiology
- The iJOBS Shadowing Experience: Walk a semester in a professional’s shoes - Susan Engelhardt, Rutgers University
- Staying the Course: Factors that affect the persistence of underrepresented minority postdocs in academia - Marcus Lambert, Weill Cornell Graduate School of Medical Sciences

Moderator: Inge Wefes, Ph.D.

03:45 – 04:00  Break

04:00 – 04:45  Institutions in Action: Part 4

- Career Outcomes Transparency at the Individual Lab Level: Piloting trainee outcomes on UCSF faculty profile webpages - Terri O’Brien, University of California - San Francisco
- It’s a Good Thing: Sustaining the progress made by the Vanderbilt ASPIRE Program - Kim Petrie, Vanderbilt University
- The Science of Mentoring - Layne Scherer and Erin Dolan, National Academies of Sciences, Engineering, and Medicine

Moderator: Inge Wefes, Ph.D.

04:45 – 05:30  Seeding Partnerships: Mingling for introverts

05:30 – 06:30  Consortium Reception (Cash Bar)

06:30  Dinner on your own

Thursday, October 25, 2018

Maintaining Momentum: The Role of collaboration and community

09:00 – 09:05  Opening remarks: Tracey Baas, Ph.D.

09:05 – 10:35  Plenary Session: Creating Sustainable Organizations: Sustainability and lessons learned from the national stage

Panelists: Kim Petrie, Ph.D., Jodi Yellin, Ph.D., Anthony Boccanfuso, Ph.D., and Cynthia Fuhrmann, Ph.D.

Moderator: Tracey Baas, Ph.D.

10:35 – 10:45  Break

10:45 – 12:45  Blue-Sky Visioning Exercise: Imagining the future:

Moderator: Rebekah Layton, Ph.D. and Tracey Baas, Ph.D.

12:45  Closing remarks: Roger Chalkley, D. Phil.

Thank you to our guests for coming

Questions or comments? Email us at contact@nihbest.org
Dr. David Asai leads the Undergraduate and Graduate Programs (UGP) group in science education at the HHMI. The UGP group designs, implements, and administers a spectrum of grants and fellowship programs. Dr. Asai’s current work as Senior Director for Science Education is guided by three beliefs: 1) the dynamic demographics of the U.S. population presents the greatest opportunity and the most compelling challenge for U.S. science, 2) all students—regardless of where they come from and where they’re going—deserve a meaningful, effective, and positive experience in science through which they will better understand the process of science, and 3) making that experience meaningful, effective, and positive is the responsibility of the faculty and administrators who define the institution’s culture.

Dr. Asai received a bachelor’s degree in chemistry from Stanford University, a Ph.D. in biology from Caltech, completed postdocs at Caltech, and the UC Santa Barbara. He was a faculty member at Purdue University for 19 years and spent several years as Head of Biological Sciences. He then spent five years at Harvey Mudd College as the Stuart Mudd Professor and Chair of Biology. Dr. Asai joined Howard Hughes Medical Institute (HHMI) in 2008.

Dr. Julia Kent is Vice President, Best Practices and Strategic Initiatives at the Council of Graduate Schools (CGS). In her ten years at CGS, she has conducted research and programs on a broad range of topics in graduate education, including Ph.D. career pathways; diversity issues; graduate admissions processes; international collaborations; quality and accountability; research ethics and integrity; and the preparation of future faculty. Currently, Julia serves as co-Principal Investigator for a multi-phase project supported by National Science Foundation and the Andrew W. Mellon Foundation, Understanding Ph.D. Career Pathways for Program Improvement (NSF #1661272), which has brought together a coalition of 65 universities working to collect and analyze data on Ph.D. careers. Julia has also overseen CGS’s Global Summit, an international meeting of graduate deans that have convened graduate education leaders from 30 countries in its 10-year history.

Dr. Kent received a bachelor’s degree in English and French from Amherst College, a master’s degree in French literature from Université de Paris VII, and a Ph.D. in 19th century French literature from John Hopkins University. Before coming to CGS, she was Assistant Professor of English at the American University of Beirut.
Mr. Tobin Smith is Vice president for Policy at Association of American Universities (AAU). In his current position, he oversees AAU’s policy projects, initiatives, and activities including the AAU Undergraduate STEM education and Ph.D. education initiatives. He is responsible for matters relating to science and innovation policy and broader impacts of science. Mr. Smith also serves on the Advisory Board to the National Alliance for Broader Impacts (NABI). Mr. Smith has written and spoken widely on science policy and funding issues and is a co-author of a book on national science policy published in 2008 by the University of Michigan Press titled, Beyond Sputnik – U.S. Science Policy in the 21st Century.

Mr. Smith received a bachelor’s degree in general studies from the University of Michigan and a master’s degree in legislative affairs from George Washington University. He began his career on Capitol Hill as a legislative assistant to Congressman Bob Traxler (D-Michigan). Afterward, Mr. Smith worked as a federal relations representative in the Washington D.C. Offices of the Massachusetts Institute of Technology (1992-1999) and the University of Michigan (1999-2002). In 2003, Mr. Smith began working at AAU where he currently serves as Vice President for Policy.

Dr. James Sterling is a founding faculty member of Keck Graduate Institute KGI and has helped develop a curriculum that prepares students of the applied life sciences to work on the development of laboratory research tools, laboratory automation, and micro-bioanalytical methods. Dr. Sterling served as Vice President for Academic Affairs and Dean of Faculty at KGI from 2009-2014 and led the establishment of the Professional Science Master’s (PSM) National Office at KGI. Dr. Sterling has been involved in the development of several graduate programs, including the Master of Business and Science (MBS), the Ph.D. in Applied Sciences, and the Postdoctoral Professional Master’s (PPM) at KGI.

Dr. Sterling received his bachelor’s degree in mechanical engineering from Texas A&M University and a master’s degree and a Ph.D. in mechanical engineering from the California Institute of Technology. He worked at Los Alamos National Laboratory and Advanced Projects Research as a systems engineer and project manager. Dr. Sterling has been a faculty member at Keck Graduate Institute (KGI) since 2000.
Dr. Anthony Boccanfuso is President of the University-Industry Demonstration Partnership (UIDP) and holds an appointment in the Provost’s Office at the University of South Carolina. He also serves on several boards including the MedStar Health Research Institute and the Hydrogen Education Foundation for which he is the current chair. As UIDP President, he champions its singular focus on improving collaborations between the academic and corporate sectors. In addition, He regularly consults for government agencies, non-profit organizations, and private firms. He is regularly sought after as a speaker (both domestically and internationally) and has published several reference sources on industry-academic engagement.

Dr. Boccanfuso received a bachelor’s degree in chemistry and political science from Furman University and a Ph.D. in inorganic chemistry from the University of South Carolina. Career includes time in government at both the National Science Foundation and National Institutes of Health. He has also worked as a senior research administrator at several universities where he had direct responsibility for compliance, grants administration, incubators, industry engagement, intellectual property, and research strategy.

Dr. Cynthia Fuhrmann is Assistant Dean of Career and Professional Development and Associate Professor of Biochemistry and Molecular Pharmacology at University of Massachusetts Medical School. She founded and directs the graduate school’s Center for Biomedical Career Development, through which (as PI of UMassMed’s NIH BEST award) she has led the integration of career development into and across the core Ph.D. training curriculum. She is also the PI of an initiative to create a national center that will bring together stakeholders in graduate and postdoctoral education to facilitate the dissemination and growth of evidence-based educational practices for Ph.D. career development. This initiative has funding from the ASBMB, Burroughs Wellcome Fund, and National Science Foundation (NSF).

Dr. Fuhrmann received a bachelor’s degree in chemistry from UC Davis and her Ph.D. in Biochemistry and Molecular Biology from UC San Francisco. Her scholarly work includes studying the career interests of Ph.D. trainees and developing educational frameworks for Individual Development Plans (including co-authorship of myIDP, hosted by the American Association for the Advancement of Science).
Dr. Jodi Yellin is a Director of Science Policy at the Association of American Medical Colleges (AAMC). She is responsible for the Association’s policy agenda focusing on biomedical research training and the biomedical research workforce. She also serves as the Scientific Affairs unit liaison to the AAMC Group on Graduate Research, Education, and Training (GREAT). Dr. Yellin has led several initiatives in collaboration with the research training community, including producing a report on Institutional Approaches to Tracking Research Trainee Information, drafting and updating the Compact Between Postdoctoral Appointees and Their Mentors and the Compact Between Biomedical Graduate Students and Their Research Advisors, and initiating a research and research training innovation award program.

Dr. Yellin earned her bachelor’s degree in chemistry from MIT and her Ph.D. in molecular biophysics and biochemistry from Yale University. She later worked as a Howard Hughes Postdoctoral Associate at the Center for Advanced Biotechnology and Medicine at Rutgers. Dr. Yellin was also a Christine Mirzayan Science and Technology Policy Fellow on the Board of Higher Education and Workforce at The National Academies.

Dr. Kim Petrie is currently the Assistant Dean for Biomedical Career Development at Vanderbilt University. Dr. Petrie is Co-PI of Vanderbilt’s NIH BEST award, which supported the creation of the ASPIRE (Augmenting Scholar Preparation and Integration with Research-Related Endeavors) Program. Through ASPIRE, VU created career planning resources for first-year graduate students, a series of modules and workshops to broaden training experiences, a nationally-available video interview series highlighting alumni career paths, an internship and employer site visit program, and a professional development series for postdoctoral fellows. At the national level, Dr. Petrie is currently Secretary of the Graduate Career Consortium (GCC), an organization comprised of nearly 400 members who support the career and professional development of graduate and postdoctoral. She has been a member of GCC since 2006 and has served on numerous committees as the GCC incorporated.

Dr. Petrie received a bachelor’s degree in biology from Lawrence University and her Ph.D. in pharmacology from Vanderbilt University. In 2005, she helped launch the Biomedical Research Education and Training Office (BRET) at VU and is currently the assistant dean.
Part 1

Faculty Perceptions and Knowledge of Career Development of Trainees in Biomedical Science: What do we (think we) know?

Stephanie W. Watts¹, Dia Chatterjee¹, Julie W. Rojewski¹, Carol Shoshkes Reiss², Tracey Baas³, Kathleen L. Gould⁴, Abigail M. Brown⁴, Roger Chalkley⁴, Patrick Brandt⁵, Inge Wefes⁶, Linda Hyman⁷, J. Kevin Ford¹

¹Michigan State University
²New York University
³University of Rochester Medical Center
⁴Vanderbilt University School of Medicine
⁵University of North Carolina
⁶University of Colorado Denver | Anschutz Medical Campus
⁷Boston University School of Medicine

The Broadening Experiences in Scientific Training (BEST) program is an NIH-funded effort testing the impact of career development interventions (e.g. internships, workshops, classes) on biomedical trainees (graduate students and postdoctoral fellows). BEST Programs seek to increase trainees’ knowledge, skills and confidence in exploring and pursuing expanded career options, as well as increase training in new skills that enable multiple career pathways. Faculty mentors are vital to a trainee’s professional development, but data about how faculty members of biomedical trainees view the value of, and the time spent on, career development for trainees are lacking. Seven BEST institutions investigated this issue by conducting faculty surveys during their BEST experiment. The survey intent was to understand faculty perceptions around professional and career development for their trainees. Two different, complementary surveys were employed, one designed by Michigan State University (MSU) and the other by Vanderbilt University. Faculty (592) across five institutions responded to the MSU survey; 225 faculty members from two institutions responded to the Vanderbilt University survey.

Participating faculty were largely tenure track and male; approximately 1/3 had spent time in a professional position outside of academia. Respondents felt a sense of urgency in introducing broad career activities for trainees, given a recognized shortage of tenure track positions. They reported believing career development needs are different between a graduate student and postdoctoral fellow, and they indicated that they actively mentor trainees in career development. However, faculty were uncertain as to whether they actually have the knowledge or training to do so effectively. Faculty perceived that trainees themselves lack a knowledge base of skills that are of interest to non-academic employers. Thus, there is a need for exposure and training in such skills. Faculty stated unequivocally that institutional support for career development is important and needed. BEST Programs were considered beneficial to trainees, but the awareness of local BEST Programs and the national BEST Consortium was low at the time surveys were employed at some institutions. It is our hope that the work presented here will increase the awareness of the BEST national effort and the need for further career development for biomedical trainees.

BEST Consortium Roadshow

Tracey Baas¹, Ashley Brady², Patrick Brandt³, Christine Chow⁴, Laura Daniel⁵, Emma Flores⁵, Tami Hutto⁶, Linda Hyman⁹, Bill Lindstaedt⁷, Ambika Mathur⁷, Judith Moldenhauer⁹, Gabriela Monsalve⁷, Julie Rojewski³, Barbara Schreiber³, Abby Stayart¹⁰, Susi Varvayanis¹¹

¹University of Rochester Medical Center
²Vanderbilt University
³University of North Carolina at Chapel Hill
⁴Wayne State University
⁵University of California, Irvine
⁶Emory University
⁷University of California, San Francisco
⁸Michigan State University
⁹Boston University
¹⁰University of Chicago
¹¹Cornell University

All 17 BEST institutions have tested numerous workshops at their individual institution, learning what works and what doesn’t. Through consortium networking, people learned about some of the most successful workshops, resulting in invitations to sister BEST Institutions to present. The first traveling presentations to “hit the road” were Emory’s Birkman Self-Assessment Workshop and Boston University’s Workforce Data Workshop. To aid in workshop information exchange and dissemination, the BEST Roadshow webpage was created and now houses the work from 11 BEST institutions, showcasing 21 different presentations that address a wide range of topics, such as career exploration, creativity, interview preparation, communication and skills development. To date, workshops have been shared not only at BEST institutions but also at national meetings and conferences. As the BEST Roadshow moves from conceptual pilot to curated resource – perhaps in the format of a professional development speakers’ guild – more stringent guidelines and eval-
those skills. They collaborated with Jefferson’s Office for Professional Writing, Publishing, and Communication Support to develop editing and reviewing training for postdocs. Three one-hour training modules focused on how to improve writing content, conciseness, and correctness, and had practical examples and exercises. It was mandatory for postdocs who wanted to join PSERT, but was open to all postdocs and graduate students who wanted to improve their writing and editing skills. The workshops will continue to be offered 2-3 times/year to train new editors and improve the skills of all trainees. After the volunteer editors were trained, postdoc and graduate student submissions were solicited. The Editor-in-Chief assigns submissions to two volunteers who review the work in a roundtable setting with guidance from an experienced editor. Authors receive written commentary. Volunteer editors commit to 6 hours per semester to review and edit 1 manuscript. This collaboration shows how the self-motivation of two postdocs to enhance their own professional skills can lead to a program that can help all Jefferson graduate students and postdocs improve themselves.

Ph.D. Career Ladder Program: A grassroots approach to career development

Kathleen Flint Ehm and Nancy Goroff; Stony Brook

Stony Brook University’s Ph.D. Career Ladder Program, developed by graduate students, serves as a nimble and cost-effective national model for Ph.D. career development and exploration. The Ph.D. Career Ladder Program (PCLP) is a peer-led career mentoring program that takes small groups of graduate students and postdocs through a monthly curriculum of self-assessment, career exploration and preparation for a job search. Because the program is grassroots and peer-to-peer, it creates a supportive, learner-centered space for exploration of career paths inside and outside of academia and encourages persistence toward students’ career goals. Moreover, the limited cost and overhead to administer the program makes it highly adaptable to a range of institutional types and cultures. A pilot train-the-trainer program provides cohort support for the PCLP peer leaders and a model for institutionalization. A robust assessment of the program is underway to measure its impact on participants and the effectiveness of its programmatic elements. Key measures include enhancing students’ confidence in their career prospects, transferable skills and job-search skills, broadening students’ career horizons to include the pursuit of careers beyond academia, as well as research-grounded psychosocial variables such as shifts in scientific identity and perceived identity compatibility with diverse career pathways. This program is supported through a National Science Foundation Research Traineeship (NRT)

Developing Professional Skills: Postdoctoral scientific editing and reviewing team

Lisa Kozlowski, Megha Verma, Valentina Minieri, and Pamela Walter; Thomas Jefferson

Postdocs are looking to develop professional skills and boost their CVs as they plan for the future. They spend time writing manuscripts and often edit and review each other’s work. Because of this, two Jefferson postdocs, who were officers in the Jefferson Postdoctoral Association, formed a group called the Postdoctoral Scientific Editing and Reviewing Team (PSERT). Its purpose is to help postdocs improve editing, reviewing, and writing skills as they train together and practice those skills. They collaborated with Jefferson’s Office

Write Smarter: Feel better

Melanie Carew, Institution Cooperative Research Centre for Mental Health

There is a growing body of evidence that postgraduate research students experience higher rates of depression and anxiety compared to the general population (Levecque et al 2017). While most colleges provide counseling or support services, many students delay seeking help until they are experiencing serious mental health problems (Woolston 2018). Write Smarter: Feel Better seeks to address this. Write Smarter: Feel Better started in 2016 as a student-led support group for biomedical research students in the Cooperative Research Centre for Mental Health. From being a student-led aspect of our professional development training, it has now evolved to become a proactive peer-based mental wellbeing program designed for, and developed in conjunction with, postgraduate research students. Write Smarter: Feel Better has now been adopted by multiple Australian universities and implemented in diverse disciplines. The program combines writing and productivity blocks with facilitated discussions with aim to build social support networks, providing opportunities for students to discuss problems and seek solutions. The presentation will summarize learnings from the development and roll-out of Write Smarter: Feel Better to date, including:

- Co-development of the program with students
- Scale up and adoption of Write Smarter: Feel Better by Australian universities
- Organizational supports to be considered when implementing peer led support groups
- Impact on career outcomes for postgraduate students involved in the pilot and development

Developing Professional Skills: Postdoctoral scientific editing and reviewing team

Lisa Kozlowski, Megha Verma, Valentina Minieri, and Pamela Walter; Thomas Jefferson

Postdocs are looking to develop professional skills and boost their CVs as they plan for the future. They spend time writing manuscripts and often edit and review each other’s work. Because of this, two Jefferson postdocs, who were officers in the Jefferson Postdoctoral Association, formed a group called the Postdoctoral Scientific Editing and Reviewing Team (PSERT). Its purpose is to help postdocs improve editing, reviewing, and writing skills as they train together and practice those skills. They collaborated with Jefferson’s Office
award in the Innovations of Graduate Education (IGE) Track to Stony Brook University, which focuses on expanding, improving and institutionalizing the Ph.D. Career Ladder Program, and testing its effectiveness as a career development tool.

Part 2

Hit the Ground Running: A professional development program for post-doctoral scholars

Sharona E. Gordon, University of Washington

The mission of Hit the Ground Running is to empower postdocs to: define their authentic scientific identity; to build a supportive community of peers and mentors; to practice skills needed to run a successful group; to market themselves as candidates and independent scientists; and to contribute to diversity and inclusion of the biomedical workforce. This 2-year course takes postdoctoral scholars through many of the challenges faced each day by academic researchers through monthly meetings. Although not all our postdoctoral scholars aspire to progress their careers within the academy, many of the skills included in the course will be useful for those on nonacademic career paths as well. Feedback from our previous postdoctoral scholars, as well as our own experience, indicates that new assistant professors feel as though they are “dropped into the deep end of the pool without knowing how to swim.” We believe that these feelings of near-drowning can be avoided or mitigated by increasing the preparation we provide as part of postdoctoral training. The goal of this program of Academic Preparation for Postdoctoral Scholars is to provide skills and information so that postdoctoral scholars transitioning to independent academic positions know what to expect and how to manage many of the challenges they will face.

Lessons Learned: Obstacles and solutions for developing an internship program

Rebekah L. Layton, Patrick D. Brandt, Patrick J. Brennwald, University of North Carolina at Chapel Hill

Though a common element included in many professional programs, internships for Ph.D. trainees and postdocs can be difficult to initially setup and/or to incorporate into existing training models. Navigating a number of practical and philosophical barriers, UNC-Chapel Hill has now placed almost 100 interns in local for-profit and non-profit organizations. In this presentation, we will discuss common barriers to setting up an internship program and share some examples we have implemented to overcome some of those barriers. We will share lessons learned from the challenges we have navigated including: geographic constraints; balancing internship length with stake holder interests; options for funding internships; guaranteeing intern medical insurance and worker’s compensation coverage; and executing affiliate agreements and non-disclosure agreements with internship hosts. Participants will be given example documents to facilitate creation and implementation of internship programs including sample Scope of Work forms, Affiliate Agreements, and Non Disclosure forms. Other topics to be discussed include how to create and foster partnerships; methods to increase faculty buy-in; and strategies for empowering trainees to set up their own internships.

How Career Development Programming for Graduate Students has Evolved to Satisfy Their Changing Interests and Needs

Jaime Rubin, Columbia University

Career development programming for graduate students has dramatically evolved over the past 25 years and these changes reflect the expanding and complex needs of this student population. When thinking ahead about future programming, it would be very instructive to review how and why we have arrived at today’s current situation. Twenty-five years ago, I founded two formal graduate-level courses that continue today, “Funding and Grantsmanship for Research and Career Development Activities” and “Responsible Conduct of Research and Related Policy Issues” (RCR). The former was created as a result of my own interests and experiences working with junior investigators and realizing their near total lack of understanding of how biomedical research is funded at U.S. academic institutions. While the RCR course was initially founded as a result of NIH’s requirement for formal training in this area, the course addresses more than the required topics. Initially, both were treated as “stand alone” courses, separate from any specific Master’s or doctoral program. Now, both are formal components of graduate level curriculums, with expanding student attendance. Both are described in NIH training grant and individual fellowship applications. While both courses were started almost fortuitously, it is clear that going forward, we need to accurately identify the full range of professional skills (e.g., laboratory and fiscal management) that will be the most valuable to junior academic scientists transitioning to independence, starting their own research teams, and developing their research program, and then develop a robust and multi-faceted comprehensive curriculum based on these needs.
Progress Report: Online workshop on building a professional development program

David Fruman, University of California Irvine

The goal of this project is to produce an online mini-course or workshop that provides guidance and resources to institutions that wish to build professional development programs for biomedical trainees. These recommendations will be based on best practices from NIH-BEST experience at UC Irvine and other consortium institutions. The intended audience includes: Graduate Deans and Associate Deans, Career Center staff members, other academic staff. The workshop will consist of a series of modules covering the following topics: (1) Why does your university need this? Building a case for why we need professional development programming. (2) How to organize, staff and fund it? Explore how to leverage existing campus resources (including alumni) and build new partnerships. (3) How to implement it? Strategic plan for developing coursework, workshops, experiential learning. (4) Evaluation and sustainability. (5) Success stories. These will include short video interviews with stakeholders (Program Directors, Coordinators, Deans, faculty, etc.) and spotlights of program alumni. Each module will begin with an introductory script of approximately 1 minute, describing learning objectives and outlining the material to be covered. The rest of each module will be an interactive workshop where viewers can explore NIH-BEST resources, consider “Reflection Questions”, and begin building their proposals. We are producing these videos in collaboration with the Division of Continuing Education at UC Irvine. The platform for publishing the workshop is yet to be determined. Work is ongoing and a sample video will be presented at the conference.

Planning Your Scientific Journey: Outcomes from an online professional development course

Shannon Behrman, iBiology

Despite its importance, training around how to ask scientific questions tends to be unstructured and variable, leaving some trainees without a good understanding of how to build a workable research problem. We address this gap in training through our free online course “Planning Your Scientific Journey” (bit.ly/BCLS-self-paced). The main objective of this course, and the other courses on iBiology Courses (courses.ibiology.org/), is to provide a foundation upon which life science trainees can build their unique scientific careers, regardless of their training environments or experiences.

The goals of PYSJ are to have students (1) critically evaluate potential research questions, (2) develop a research plan, and (3) prepare to meet with their mentor to discuss their plan. The free course is 6 weeks in length, requiring 1-3 hours of work per week. PYSJ is innovative in both curriculum design and video production. Course videos feature a collection of scientists with different backgrounds, career stages and scientific approaches. We ran PYSJ twice in 2017 and had a combined student enrollment of over 2000, representing a diversity of institutions. We would like to present the outcomes of PYSJ using analysis from: (1) pre and post-course surveys, (2) discussion forum posts, and (3) quantitative course user data. PYSJ is additionally now available as a self-paced, always-available course. We released another course called “Business Concepts for Life Scientists” in 2018 and will soon release a course on experimental design called “Let’s Experiment: A Guide for Scientists Working at the Bench” in early 2019.

The iJOBS Shadowing Experience: Walk a semester in a professional’s shoes

Susan Engelhardt, Rutgers University

Rutgers University’s iJOBS Program (Interdisciplinary Job Opportunities for Biomedical Scientists), is a multi-phased trainee experience, designed to educate its trainees regarding professional possibilities, perspectives and preparedness. Our presentation will highlight the experiential nature of iJOBS programming, with a focus on Phase 2 shadowing/externship, mentoring and maturation of each trainee’s professional “vision.” The advantages and disadvantages of an externship relative to an internship will be covered from the perspective of the trainee, academic institution, and hosting company. Discussion of professional relationships formed will open to glimpses of trainee shadowing activities and resulting key learnings, viewed against a backdrop of employment candidacy requirements. Program logistics will be shared to serve as benchmarks for partner university program development and lead the way to expanded BEST programming.

Staying the Course: Factors that affect the persistence of underrepresented minority postdocs in academia

W. Marcus Lambert¹, Juanita Morris², Matthew Cipriano³, Jacob Sneva³, Linnie Golightly³

¹Weill Cornell Graduate School of Medical Sciences
²Teachers College, Columbia University
³Weill Cornell Graduate School of Medical Sciences

Despite moderate success in increasing the number of underrepresented minority (URM) doctoral students in
the biomedical sciences, the growth of URM faculty in academia has remained flat. While the low number of available faculty positions is a considerable factor, we hypothesize that it does not fully account for decreased academic career interests among URM trainees. To better understand the factors that influence divergence from conventional academic research careers, we examined the career goals of nearly 1300 biomedical postdocs, by gender and underrepresentation. While 45% of URM postdocs and 48% of postdocs overall intend to pursue a research-intensive faculty position, a higher percentage of URM male postdocs choose careers outside of research or science (OR 1.9, p<0.05) compared to other postdocs. Divergence from academia for all postdocs was found in part to be dependent on outcome expectations and self-efficacy in publishing and achieving grants. While URM postdocs were found to have fewer publications (p<0.01), URM postdocs demonstrated significantly higher self-efficacy (p<0.05) in publishing than non-URM postdocs. Moreover, 40% of even the most productive postdocs (by publications and journal impact factor) opt out of academic careers, citing job prospects (OR 0.294, p<0.001) and financial security (OR 0.274, p<0.001). In contrast to their peers, URM postdocs are uniquely motivated by values such as community (in the academy), mentoring, and the freedom to conduct research in areas that affect minority populations. The results from this study point to the need for interventions that could alleviate barriers in choosing academic careers faced by underrepresented postdocs.

**Career Outcomes Transparency at the Individual Lab Level: Piloting trainee outcomes on UCSF faculty profile webpages**

Terri O’Brien, University of California San Francisco

Our vision is to provide career outcomes information on UCSF faculty profile webpages, meaning that visitors to a faculty member’s profile will see career outcomes for all trainees who have left the PI’s lab. We are completing a pilot with one basic science department at UCSF and can report on what we’ve learned, as well as show a working prototype. Issues of tracking, privacy and faculty buy-in will be discussed. UCSF faculty profiles are built using software initially developed by the Harvard Catalyst program and funded through the NIH CTSA program. Many other institutions leverage this software (Profiles Research Networking Software), so our vision is to share what we’ve developed at UCSF with the broader “Profiles” community in order to make PI-level career outcomes transparency commonplace.

**It’s a Good Thing: Sustaining the progress made by the Vanderbilt ASPIRE Program**

Kim Petrie, Ashley Brady, Abigail Brown, Kate Stuart, Roger Chalkley, Kathleen Gould, Vanderbilt University

The Vanderbilt ASPIRE Program has changed the nature of Ph.D. and postdoctoral training in the biomedical sciences at Vanderbilt. Prior to ASPIRE, our office focused primarily on career exploration programming and individual coaching. Since the advent of ASPIRE, we have integrated professional development into the first-year biomedical Ph.D. training programs, created new professional development programs tailored to postdoctoral fellows, provided broader career and professional development training opportunities for students and postdocs, increased outreach to faculty, and engaged alumni and employers to enhance the experiences of our current trainees. In this presentation, we will share strategies we are implementing to sustain our much-expanded career development initiatives moving forward, including ways we are engaging our current trainees, parents of current students, faculty, institutional leadership, campus partners, alumni, and employers.

**The Science of Mentoring**

Layne Scherer¹, Erin Dolan²

¹The National Academies of Sciences, Engineering, and Medicine
²University of Georgia

Identifying effective practices of mentorship in science, technology, engineering, mathematics, and medicine (STEMM) is a science in itself. This session will provide an opportunity for mentors and program directors to share their principles and practices of mentorship in diverse career development with the Committee on the Science of Effective Mentoring in STEMM of the National Academies of Sciences, Engineering, and Medicine. We will present a brief overview of the history of the Committee and some of the research on effective mentoring in STEMM. We will also include a brief discussion of the topics of conversation we will lead during the mingling session that follows, including styles of mentorship, models of mentorship, resources for mentorship, and the future of mentorship. Representatives from the committee will be available for further discussion. Concepts and ideas developed during the session will be shared with the Committee on the Science of Effective Mentoring in STEMM of the National Academies. The committee will issue a final report and also create an online interactive guide of effective programs and practices that can be adopted and adapted by institutions, departments, and individual faculty members. More information about the project can be found at [nas.edu/mentoring].
Resources for Students

As a result of BEST funding, institutions within the consortium have created valuable resources for early career scientists and those who train them.

Boston University has generated workforce data with an online software tool called Labor Insight™. The data demonstrate top job titles, employers, high demand areas, job trends, and skills required for the diverse career options available to biomedical trainees [bu.edu/best/job-search/biomedical-workforce-data/]

Cornell University partnered with Biogen to develop a Drug Development Conference. The purpose of the conference was to assist trainees in understanding the difference between basic and applied science [science-mag.org/advertorials/novel-target-accelerating-drug-development-biomedical-science-training].

Michigan State University created an online portal, MSU Career Success, for graduate students, post docs, and faculty. This website offers resources for personal and professional development that moves through different phases of graduate education and beyond. Open to all, no affiliation with MSU needed [careersuccess.msu.edu]. MSU also created an online resource to track trainee participation in career development, the BEST Action Inventory (BAI) permits trainees to create an account where they log different activities, compare their activity to an overall aggregate of other trainees, and capture notes about their activities. A great tool for training grants, professional development programs, and anyone interested in exploring data around engagement in career development opportunities, BAI is adaptable for different campuses [bai.msu.edu].

The University of California, Irvine created a webpage with information about various career paths for their trainees [gps.bio.uci.edu/career-paths/]. They have also started a YouTube channel where they upload 5-minute TED-talks that their trainees develop during UCI’s Science Communications course [youtube.com/channel/UCNCNZbrcHol2nfx0akbT3jg/videos].

The University of Rochester (UR) has created a blog that includes Career Story posts from visiting scientists, and trainee- and mentor-written articles from their quarterly UBEST Newsletter that describe experiences at UR and at internship sites [urmc.rochester.edu/education/graduate/ur-best-blog.aspx].

University of Massachusetts Medical School (Worcester) developed guides and online resources for trainees and educators through the Center for Biomedical Career Development (cBCD) that was established via the BEST award. The cBCD website includes a section on Career Pathways to help students and postdocs define actions for achieving career path-specific goals within their Individual Development Plan (IDP). The website also includes an in-depth section about IDPs, including an example IDP and an IDP guide for research advisors and other mentors (in the website’s Educators’ Portal). The program has an active Twitter account (@GSBScareer) and disseminates a Weekly Highlights e-Newsletter (anyone can sign up—see the website). The program developed a library of job simulations, called #MicroSims, designed to expose trainees to career paths via very time-efficient (1-2 hours) introductory simulations. Under development is a facilitation guide for the program’s Career Pathways Communities and papers outlining (a) the rationale and early outcomes of our approach of integrating career development into and across the Ph.D. curriculum and (b) adapting our career planning course to be a requirement in the Ph.D. curriculum. For more info: BEST.umassmed.edu, GSBScareer@umassmed.edu.

Rutgers University has podcasts, slide decks, and overviews of many of the workshops and simulations they have done over the past 4 years on their website along with bios and contact information for the speakers so that trainees can use the website as a reference [ijobs.rutgers.edu/events.php#past-events]. Rutgers’ also has a blog for trainees that contains great advice and review of topics related to career development. The blog also covers Rutgers’ events and highlights take home messages [ijobs.rutgers.edu/wordpress/#sthash.dfYNz4vr.dpbs].

Vanderbilt University (VU) offers a wide range of resources for Ph.D. students and postdocs. Beyond the Lab is series of video interviews with Ph.D. and postdoc alumni who pursued various careers. The series can be found on YouTube and is available for anyone to watch. VU uses twitter to keep their students up-to-date with their current career development offerings @VUBretASPIRE, and they also have a Twitter feed just for job openings @VUBRETPhDJobs.

Virginia Tech (VT) hosts a blog written by Students and Postdocs. Trainees who have received travel awards to attend professional development opportunities write about the event [info.vtc.vt.edu/best/career-blog/]. VT continues to run assessments of their BEST program
Wayne State University (WSU) promotes career exploration and provides a range of professional development opportunities for graduate students and postdoctoral scholars preparing for the future with a diverse set of interests and professional goals [grad-school.wayne.edu/professional-development]. WSU also has a blog devoted to news, stories, and events related to the exploration of nonacademic career options by doctoral trainees and postdoctoral scientists [blogs.wayne.edu/bestwayne/2016/06/01/welcome-to-the-best-program-blog/].

Collaborations

One very valuable outcome from the BEST funding was the information and resources created as a result of the collaborations formed. Below are a few of those examples.

Presentations

2017 BEST Practices Workshop at AAMC GREAT

The goal of this workshop was to share with the biomedical research training community best practices and lessons learned from the NIH BEST Programs, and offer practical guidance on how to motivate, create, implement, and evaluate career and professional development opportunities for doctoral and postdoctoral scholars. Each of the 17 BEST institutions presented, and proceedings of the BEST Practices Workshop can be found at [nihbest.org/2017best-practices-workshop].

GREAT Career Outcomes: Emerging Best Practices for Tracking Trainees and for Data Utilization

Tracey Baas¹, Patrick Brandt², Roger Chalkley³, Tammy Collins¹, Allison Fryer⁴, Tamara Hutto⁵, Patricia Labosky⁶, Ambika Mathur⁷, Kim Petrie⁸, Abby Stayart⁹, Jackie Wirz⁵, and facilitator John Horn¹⁰

¹University of Rochester
²University of North Carolina Chapel Hill
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⁴National Institute of Environmental Health Sciences
⁵Oregon Health and Science University
⁶Emory University
⁷National Institutes of Health
⁸Wayne State University
⁹University of Chicago
¹⁰University of Pittsburgh

New professional development programs depend on both creative license and funding. One-time funding infusions often produce great short-term success, but strong programs depend on ongoing support for long-term impact. How do we turn pilot experiments into permanent programs? As scientists, we are accustomed to providing detailed data to support our hypotheses, but this approach is not always effective in communicating the impact of new programs. This session addressed two questions that must be considered to successfully gain support: (1) How do we decide WHO to approach with funding requests for program sustainability, and (2) HOW do we tell a convincing story? (2018 AAMC GREAT Meeting).

Resources

BEST Consortium Roadshow
[nihbest.org/best-road-shows/]

All 17 BEST institutions have tested numerous workshops at their individual institution, learning what works and what doesn’t. The BEST Roadshow webpage was created, and now houses the work from 11 BEST institutions, showcasing 21 different presentations that address a wide range of topics (long term project, more welcome to join).

Online Workshop

UCI is collaborating with UMass Med and UNC to develop an online course/workshop that will provide guidance and resources for career development professionals to establish or expand programming at their institution. The purpose of this project is to disseminate NIH-BEST approaches of broadening professional development opportunities for biomedical trainees using an online interactive course. A series of modules will develop five topics: 1) Why
Your University Needs It, 2) Program Organization, and How to Leverage Existing Resources, 3) Program Implementation, 4) Evaluation and Tracking, and 5) Success Stories. Content will be derived from both UC Irvine local resources and the NIH-BEST website, with additional input from collaborating institutions. This is a long-term project that can be updated with additional content. Scripts have been written and videos are under development.

BEST – Beginning Enhancement Track (BET) Network Pilot Project
[bumc.bu.edu/gms/about/the-office-of-diversity-and-inclusion/undergraduate-summer-and-youth-programs/bus-best/]

BEST BET is a collaborative effort that draws upon the expertise of five research-intensive BEST institutions across the country (Boston University, Cornell University, the University of Colorado - Denver, University of North Carolina at Chapel Hill, and Wayne State University) to translate BEST practices to four minority serving undergraduate institutions (Shaw University, Xavier University, UMass Lowell, and University of Puerto Rico at Carolina).

This effort was made possible because of a two-year NSF grant that was awarded in 2017. Through BEST BET, BEST provides career panels that expose under-represented minorities (URM) students to opportunities in academia as well as the biotechnology and pharmaceutical industries, science communication, science policy, and technology/patent law. BEST BET also includes “site visits” where undergraduates from several minority-serving institutions have the opportunity to tour BEST laboratories, meet trainees, and experience a general sense of life as a graduate student. Currently, BEST consortium members involved in BEST BET are collecting data from BEST BET institutions to assess career needs for minority serving institutions as BEST BET enters their second year of the grant. The goal of BEST BET is to engage undergraduate students from populations generally underrepresented in science, technology, engineering and mathematics (STEM) earlier in their career exploration. Specifically, the project will target undergraduates who may not be aware of the multitude of career options available to them.

Projects and Publications
Experiential Learning for Career Development in Graduate and Post-Graduate Education - Recommendations for Program Development and Design
Authors in no particular order: Audra Van Wart⁴, Rebakah Layton⁵, Janet Alder⁶, Theresa O’Brien⁵, Ashley Brady⁶, Jen Greenier⁶, Abby Stayart⁷, Inge Wefes⁸, Susi Varvayanis⁹

⁴Virginia Tech
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⁶Rutgers University
⁷University of California - San Francisco
⁸Vanderbilt University
⁹University of California - Davis

Experiential learning is an effective educational tool across many academic disciplines, and it is useful also for career development training. We compare four successful mechanisms to deliver experiential learning activities for career exploration and skill building among pre- and postdoctoral trainees at our institutions. The four approaches cross the spectrum of time and resource commitment, learning objectives, and assessment formats. We share recommendations for program development and design. This resource can help other organizations determine which form of experiential learning for career training might best fit at their institutions and aims to aid in their successful design and delivery (Status: Draft in progress).

Applying Inter-rater Reliability to Improve Consistency in Classifying Ph.D. Career Outcomes
C. Abigail Stayart¹, Patrick D. Brandt²*, Abigail M. Brown²*, Tamara Hutto³, Rebekah L. Layton², Kimberly A. Petrie¹, Emma N. Flores-Kim⁵, Christopher G. Peña¹, Cynthia N. Fuhrmann⁶, and Gabriela C. Monsalve⁷*

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*Authors contributed equally to this work

The study is a collaboration of 8 public and private universities across the US (all funded through the BEST grant mechanism), in which we evaluated the reliable implementation of the Unified Career Outcomes
Taxonomy, currently in use by the sixteen institutions of the Coalition for Next Generation of Life Sciences. Using accepted statistical methods to evaluate inter-rater reliability, we identified specific categories within the taxonomy that were difficult to interpret and implement with a high degree of concordance. Through experimental modification of definitions and production of a prescriptive guidance document, we demonstrated that higher concordance could be reached. While we unequivocally support adoption of the Unified Career Outcomes Taxonomy in its current form, our manuscript provides recommendations for areas of the taxonomy which should be addressed in future revisions in order to improve the consistency and relevance of data that is being generated by institutions across the country. As the first experiment of its kind of which we are aware, our process also underlines the importance of testing any taxonomy for its reliable interpretation.

At a more granular level, our manuscript addresses outstanding questions and concerns posed within our community regarding how much time, effort, and resources are required to initiate and maintain an alumni tracking project. We specifically describe many of the challenges to implementation and interpretation that coders of alumni records will face as they begin to categorize their own alumni records.

The initial manuscript and supplemental figures were uploaded in their entirety to bioRxiv on July 19, 2018 (biorxiv.org/content/early/2018/07/19/370783).

Career planning courses increase career readiness of graduate and postdoctoral trainees
Collaborators: University of North Carolina at Chapel Hill, New York University, Boston University, University of Kentucky

Abstract: Given national calls for intentional career development during graduate and post-graduate scientific training, this study evaluates outcomes associated with one career development deployment method—a formal academic career course. The current study evaluated the effects of two academic courses in career development for Ph.D. students and postdoctoral fellows that were designed to increase career awareness, interest, and career-related confidence. Pre- and post-course surveys were administered to students enrolled in one of two unique career courses (n=32; n=148) at different academic institutions. Though the format and content provided in each course varied somewhat, participation in each course was associated with increases in career confidence including career planning/awareness skills, career transition confidence, and confidence in preparing and applying for jobs. Course participants reported increased career awareness as well as interest in an increased number of career choices overall by the end of each career course. Course participants also reported an increase in the number and type of mentors they interacted with over and above their principal faculty mentor including other faculty, professional Ph.D.s, peers, and administrative staff. These findings provide supporting evidence for the benefits of implementing structured career development efforts during Ph.D. training. While both courses included a focus on career planning skills such as self-exploration skills and career exploration skills, these findings suggested that even with a variety of career course content, delivery methods, and instructor types all led to significant gains in career awareness and readiness. The successful development and delivery of academic career courses such as those presented here can better prepare Ph.D.s for their transition from training positions into careers. (Status: Submission for peer-review in progress).

Quantifying the effect of trainee professional development on research productivity (AKA: Productivity paper)
Contributing institutions thus far: University of North Carolina - Chapel Hill, Vanderbilt University, Rutgers University, University of California - Irvine, Cornell University, Wayne State University

This paper seeks to answer the question: Does trainee participation in professional and career development activities affect time to degree or other measures of trainee productivity? Preliminary results from 5 institutions show that participation in professional development events does NOT result in any significant increase in time to degree/defense for doctoral degrees in the life sciences. In fact, in at least some cases those who participate in some professional development graduate significantly sooner than those who do not participate. This is true for both minimal participants, as well as high-dose participants. Similarly, even high-dose single activities like internships do NOT result in any significant difference in graduation time. Productivity, as measured by number of publications, does not differ between groups of professional development activity participation, suggesting that participation in professional development events may be associated with better outcomes. (Status: Data collection (partially complete); Data analysis (partially complete); Draft (in progress)).
Some of the articles published by institutions within the BEST consortium about graduate school education and strengthening the biomedical workforce.

Publications about BEST


Career: guidance, preparation, and outcomes


Diversity


Graduate Student Education


Meyers LC, Brown AM, Moneta-Koehler L, Chalkley R. Survey of Checkpoints Along the Pathway to Diverse Biomedical Research Faculty. PLOS ONE. 2018;13: e0190606.


Internships

If at anytime during the conference or afterwards you have questions or comments please reach out to us at contact@nihbest.org

Network name: Honors_Meeting
Password: BEST2018!

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