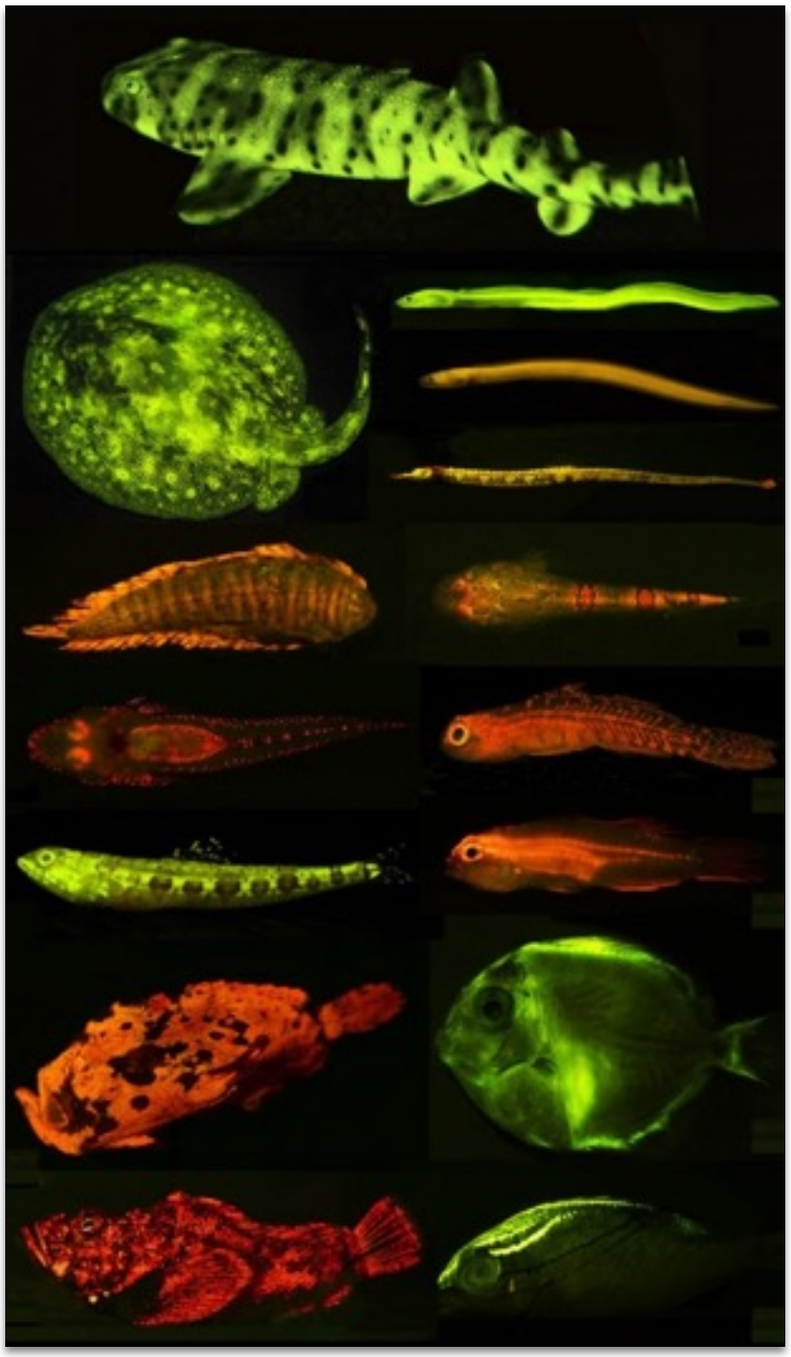
Jean P. Gaffney
City University of New York
Baruch College

NSF CAREER Workshop
March 17, 2017

CAREER: Discovery of Tunable Fluorescent Proteins from Marine Organisms: Integrating Education and Research in the Identification and Development of Novel Fluorescent Probes

The Discovery of Widespread Biofluorescence

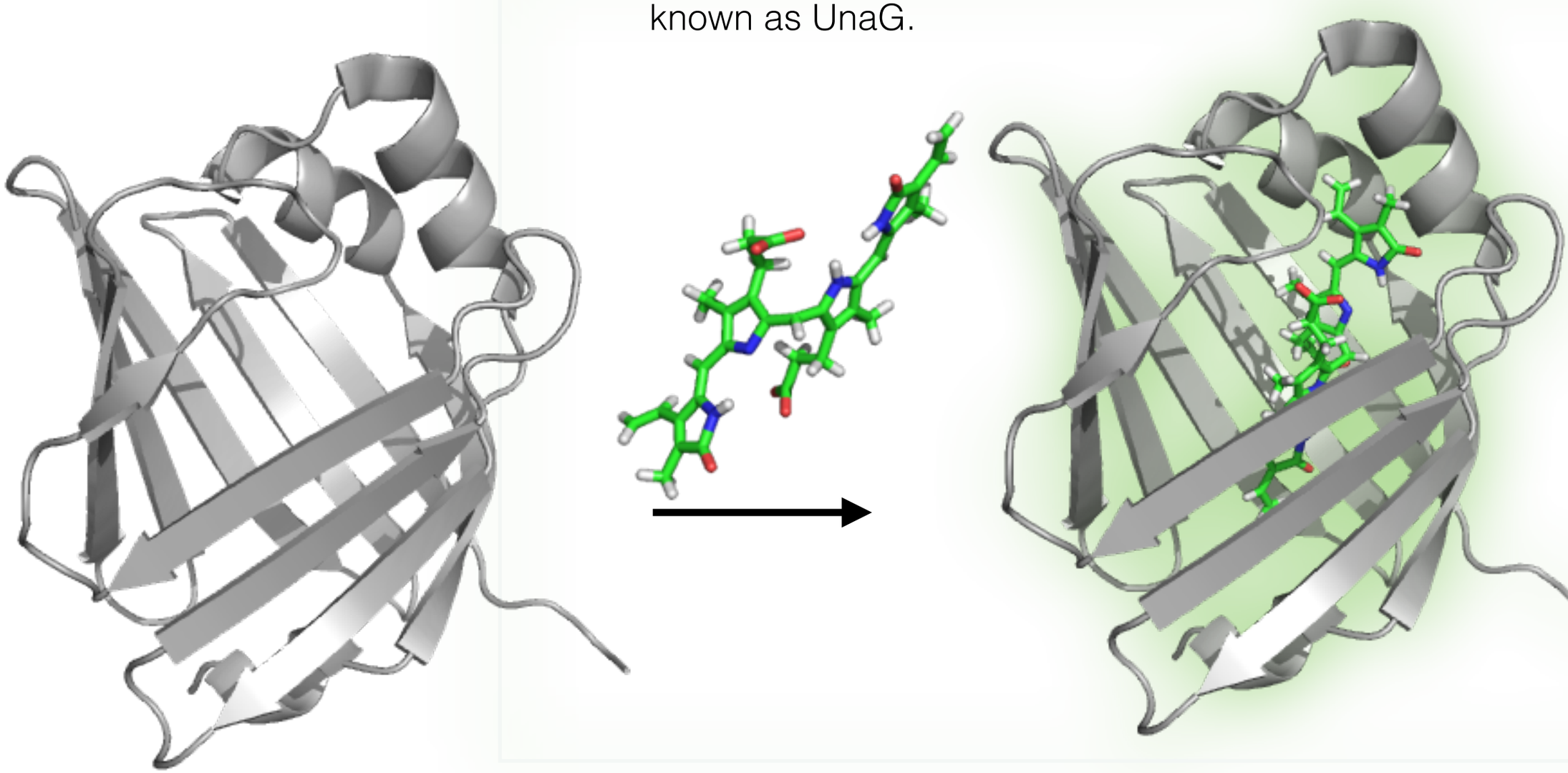
The ocean is an almost blue monochromatic environment.



Sparks, J.S., Schelly, R.C., Smith, W.L., Davis, M.P., Tchernov, D., Pieribone, V.A., and Gruber, D.F. 2014. The covert world of fish biofluoresence: A phylogenetically widespread and phenotypically variable phenomenon. PLOS ONE 9:e83259.

Green Fluorescene in the *Anguila japonica :* UnaG

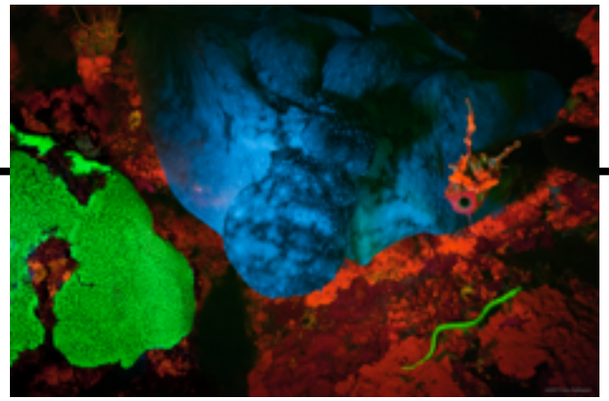
In 2013, Miyawaki et al. solved the crystal structure and determined the full sequence for the protein now known as UnaG.



Bilirubin is required for fluorescence of UnaG.

Kumagai A, Ando R, Miyatake H, Greimel P, Kobayashi T, Hirabayashi Y, Shimogori T and Miyawaki A. 2013. A bilirubin-inducible fluorescent protein from eel muscle. Cell 153: 1602-1611. doi: 10.1016/j.cell.2013.05.038

Hayashi, S., and Toda, Y. (2009). A novel fluorescent protein purified from eel muscle. Fish. Sci. 75, 1461–1469



FP in the Eel *Kaupichthys hyoproroides*

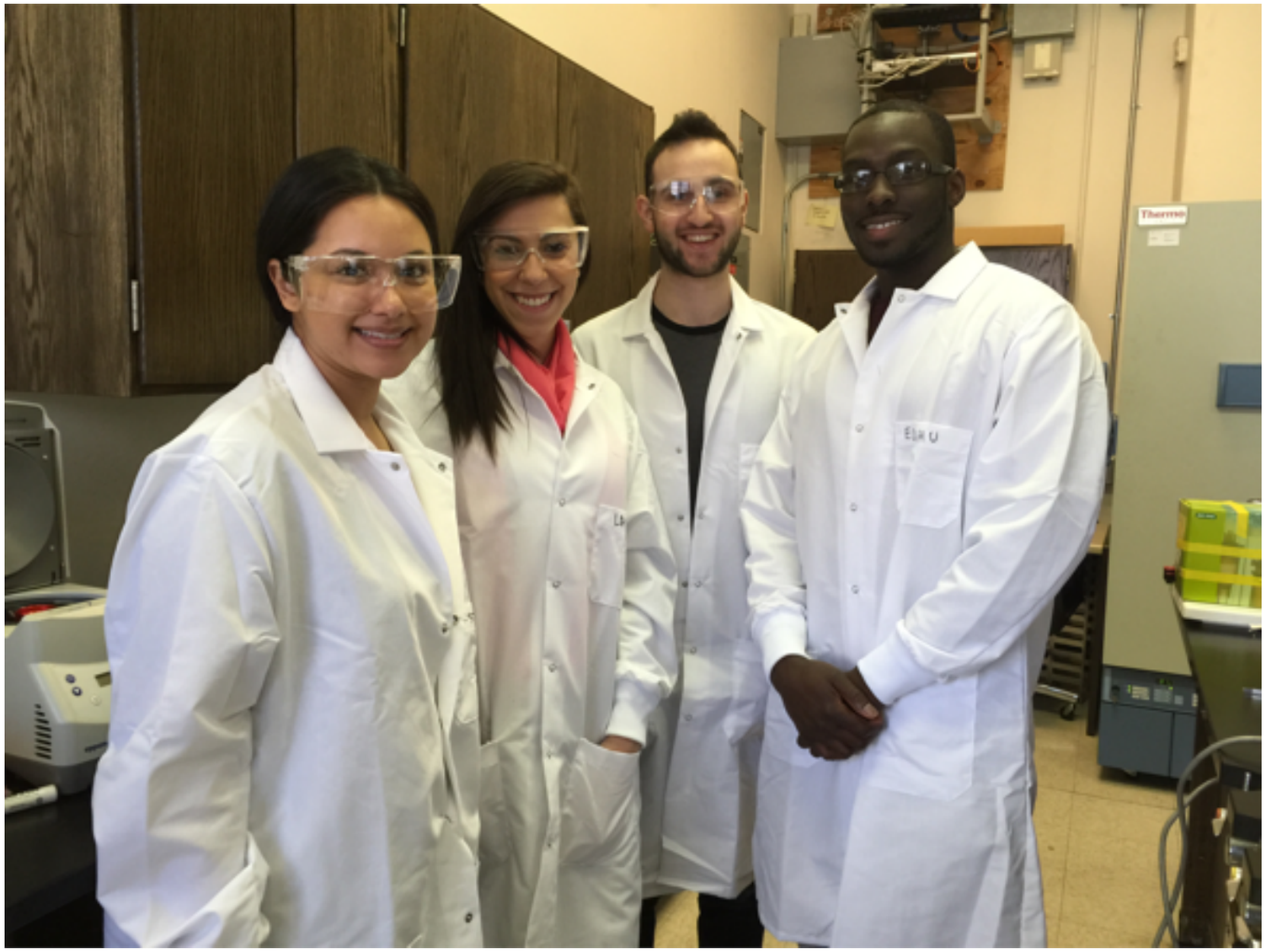
12 sequences had significant homology from assembled transcriptome data.
Only one demonstrated a unique GPP sequence motif shared with UnaG.

```
UnaG                MVEKFVGTWKIADSHNFGEYLKAIGAPKELSDGGDATTPTLYISQKDGDK
Chlopsid I FP       MFEDFLGTWKCIDSQNFGAYLAAIGAPPVLSERADATRPTVHFN-RDGDK
Chlopsid I NFP      MVDAFFGTWKLVDSQNFDEYMKALGVGFATRQVGNVTKPTVIIGQ-DGDK
Human Brain FABP    MVEAFCATWKLTNSQNFDEYMKALGVGFATRQVGNVTKPTVIISQ-EGDK

UnaG                MTVKIENGPPTFLDTQVKFKLGEEFDEFPSDRRKGVDSVVNLVGEKLVYV
Chlopsid I FP       LSLKVEHGPPPLKDVLLSFKLGEEFDEHPTDGRK-CKTLVTFEGDKLLYL
Chlopsid I NFP      VFVKTQS---TFKNTEISFKLGEEFDETTADDRN-CKSVVSMEGNSLVHV
Human Brain FABP    VVIRTLS---TFKNTEISFQLGEEFDETTADDRN-CKSVVSLDGDKLVHI

UnaG FP             QKWDGKETTYVREIKDGKLVVTLTMGDVVAVRSYRRATE-----
Chlopsid I FP       QKWDGKETVVVREIRDGNVVATLSHEGVVALRVYKKVAGPTALE
Chlopsid NFP        QKWDGKETKFVREVQDGKLVMKLTFEDVLSVRTYEKA-------
Human Brain FABP    QKWDGKETNFVREIKDGKMVMTLTFGDVVAVRHYEKA-------
```

Sequence alignment of fluorescent FABPs from eels with a non fluorescent FABP from Kaupichthys hyoproroides and human brain FABP-7. Residues highlighted in blue show conserved residues. The GPP sequence motif is highlighted in red.

Gruber DF, Gaffney JP, Mehr S, DeSalle R, Sparks JS, Platisa J, et al. (2015) Adaptive Evolution of Eel Fluorescent Proteins from Fatty Acid Binding Proteins Produces Bright Fluorescence in the Marine Environment. PLoS ONE 10(11): e0140972. doi:10.1371/journal.pone.0140972

The Lab at Baruch

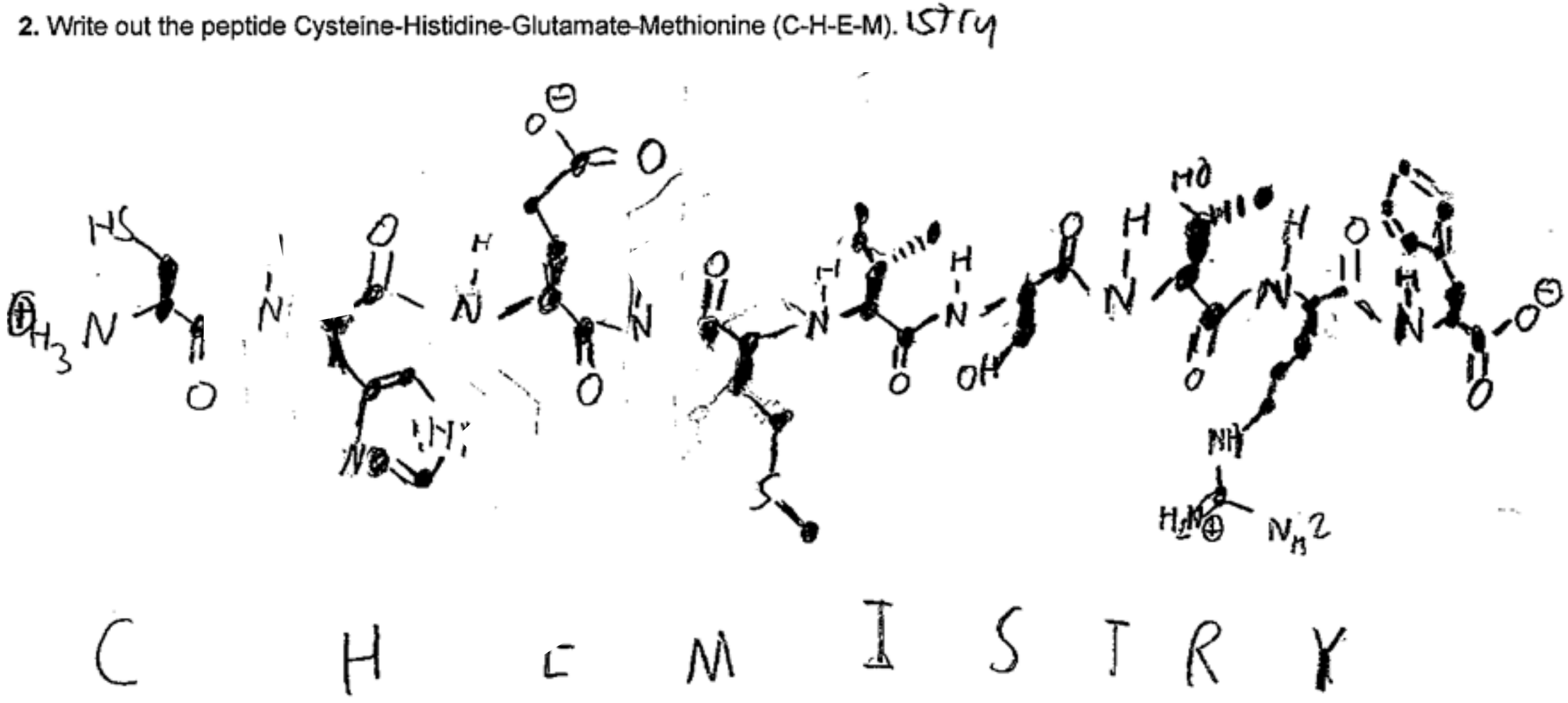


Former students: Krystal Lomeli, Laise Amorim, Gil Igin, Elihu Barclay
Current students (not pictured): Paulina Bogdan, Kiran Kuar, Janelle Orson

K-12 Outreach: Advanced chemistry learning

Work with Prof. Daniel Fried, St. Peters University

Below is a peptide drawn by a 4th grader at our after school program.
The student has learned the 20 amino acids and can construct peptide bonds.



Collaborations and Resources

Baruch COLLEGE

Prof. David Gruber
Baruch College

Prof. Kevin Gardner
ASRC

Prof. Vincent Pieribone
Yale University

CUNY ADVANCED SCIENCE RESEARCH CENTER

researchfoundationcuny

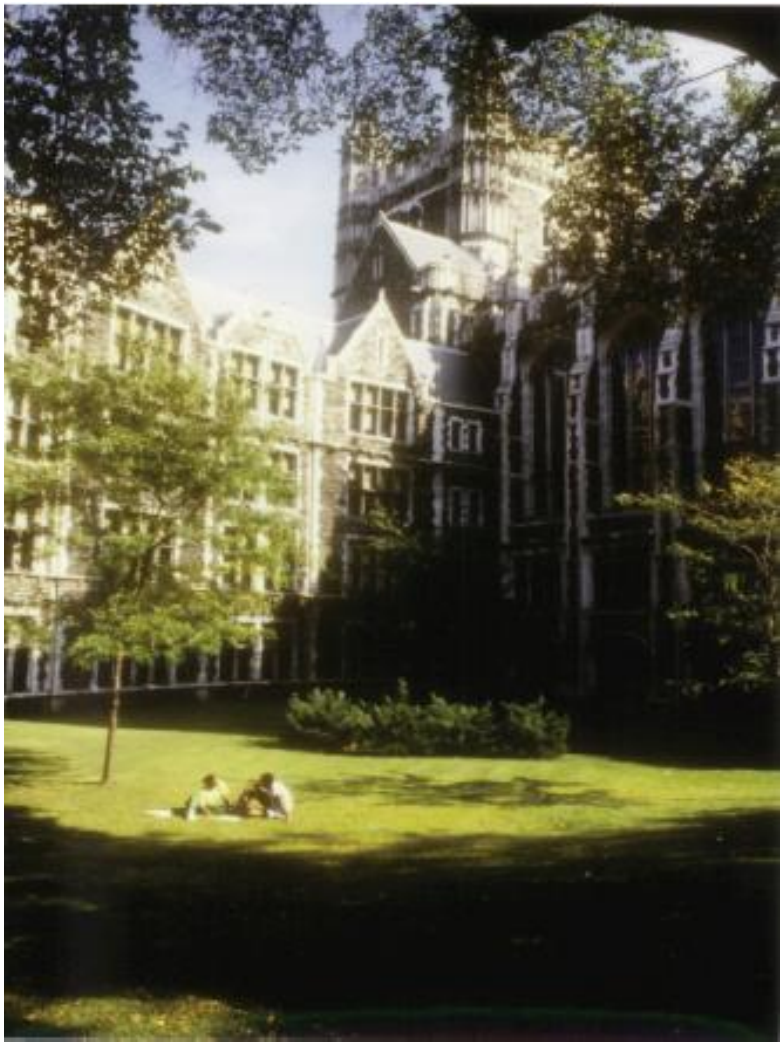
Research Foundation: Peer Review

The City College of New York

Career: Molecularly Directed Assembly of "Patchy" Particles

Ilona Kretzschmar

Professor & Chair
Chemical Engineering
City College of New York



CCNY CAREER Workshop 2017

03/17/17

CUNY The City University of New York

The City College of New York

Research Focus

"The Career development plan presented herein describes a strategy for the synthesis of submicron "patchy" particles and their molecular directed assembly into a T-structure."

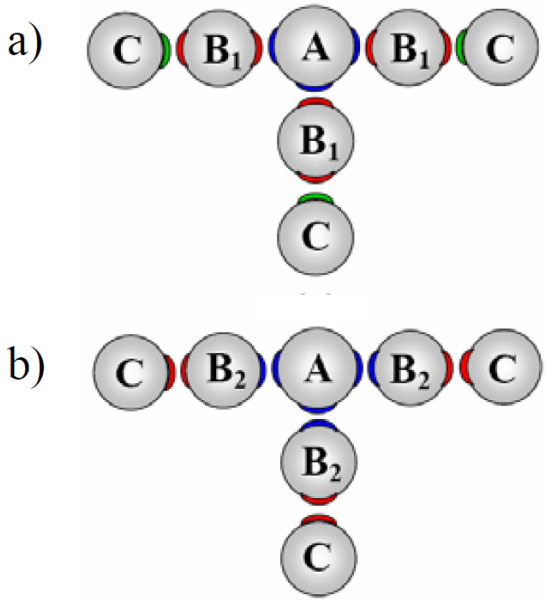


Fig. 1 Set of two T-structures. a) symmetric 2-patch particle (B_1). b) asymmetric 2-patch particle (B_2). For details see section 4.2.

1) Identification of suitable molecular linkers that will bind exclusively to a specific patch material and/or specific functional group on another linker molecule.

2) Modification of particle surfaces with one, two, or three orthogonal patches.

3) Assembly of dimers, chains and T-structures using patch/linker-patch or patch/linker-linker/patch binding interactions.

4) Computational prediction of experimental parameters and formulation of molecularly directed self-assembly guidelines.

Why the CAREER Program?

1) Funding for 5 years

- can build a program that supports long-term career
- a lot of support for students

2) Recognition

- Career award provides recognition for the awardee, helps with other endeavors
- Career award provides recognition for the college/university, increases profile/visibility of your school/division/college/university

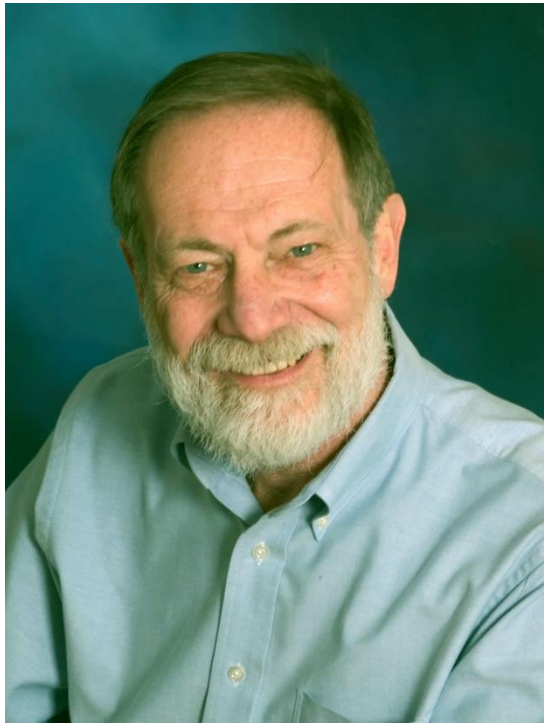
3) Other benefits

- only starting investigators can apply - less competition/higher success rate
- free advice from senior researchers in your field
- allows integration of education and research
- enables you to plan out a long-term career

Preparing for the CAREER Proposal

My Mentors – My Heroes

Prof. Alexander Couzis



Prof. Morton Denn

Prof. Maribel Vazquez

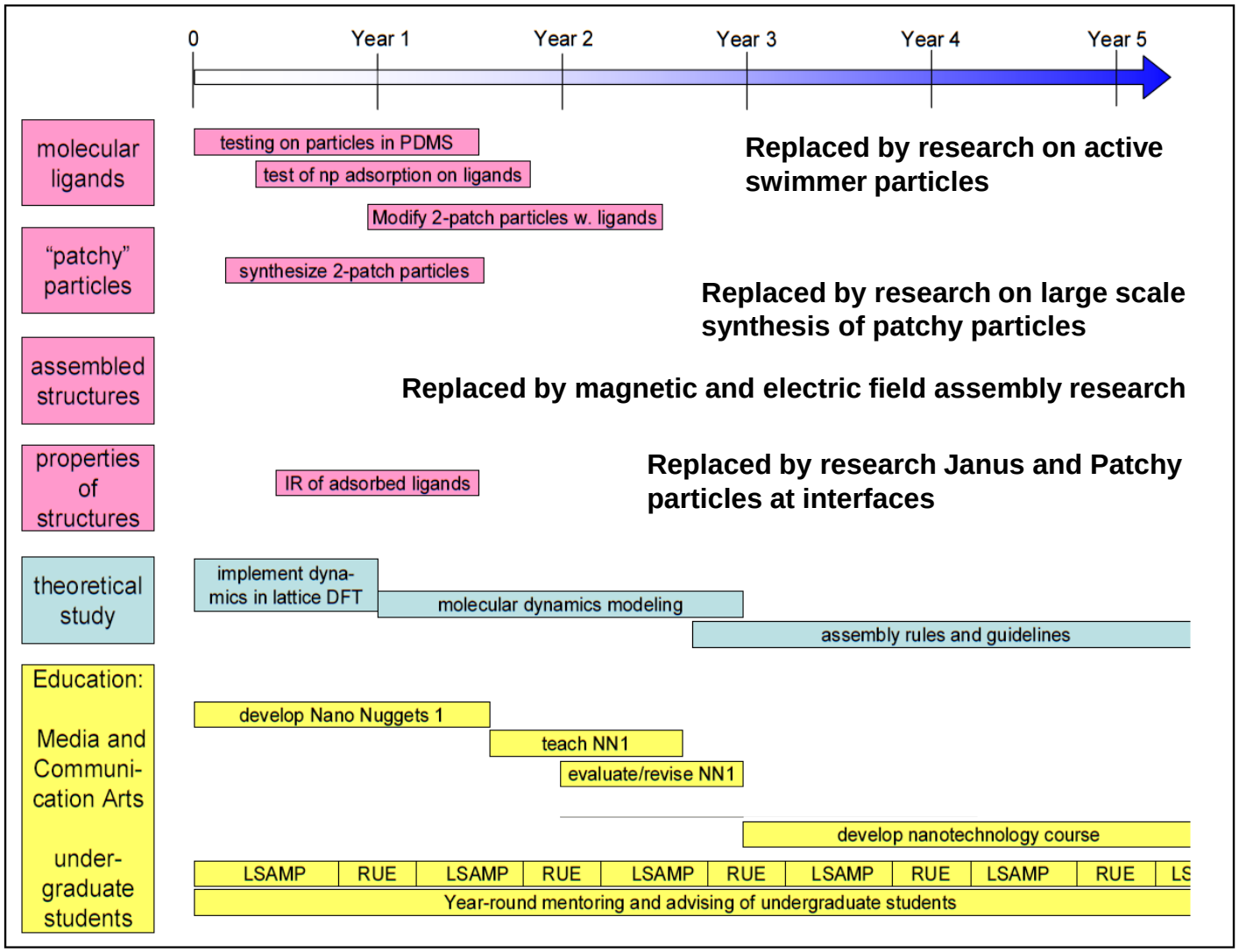
The more people read your proposal and give feedback the better it gets. Seriously!

Career Proposal Timeline/Outcomes

The Plan

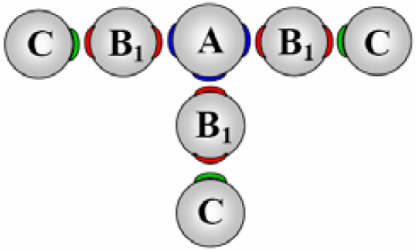
Reality

Reaction to Reality



Accurate/Logical/Clear Merits of Research

1) Goal: Implementing directional binding into spherical, submicron particles.
2) Outcome: Assembly into a T-structure.
3) Application: Model for a plasmonic switch.
4) How?: Experimental work is supported by computations.



End Goal: Set of guidelines for the molecularly directed three-dimensional assembly of submicron particles.

Merits:

1) Scientific Fundamental Outcome: Advances the understanding of self-assembly mediated by molecular linkers.
2) General Practical Outcome: Provides the material science community with methods for the preparation of two and three-patch particles.
3) Specific Outcome: Find a recipe for the assembly of particles into T-structures of exact composition.
4) Potential Applications: Plasmonic Switch, Transistor, etc

The City College of New York

Leveraging Resources for Sustainability

1) Career award gives you a **short** break (1-2 years) from proposal writing.

2) Do not wait too long with pitching new proposal ideas though.

3) Take various project ideas that result form Career research and develop new research projects.

4) Get involved in bigger projects (MRSEC, PREM, CREST, ERC, etc…) using your Career award research portfolio.

Advice – My 5 Cents

1) **NETWORKING!**
   - people you meet may be on your CAREER panel

2) **Track record in your research area**
   - people who read/review your papers may be on your CAREER panel

3) **Track record in education and outreach**
   - a long-term record convinces the panel that you are serious about education and outreach → you can propose things that are not yet established

4) **Draw from existing outreach programs**

5) **Come up with something unique and new that you want to do and will enjoy!**

The City College of New York

Do not give up!

07/2004 – 1st CAREER proposal attempt	(declined)
11/2004 – NER proposal	(declined)
01/2005 – MRI proposal	(declined)
02/2005 – unsolicited CBET proposal	(declined)
03/2005 – Sensors proposal	(declined)
09/2005 – unsolicited CBET proposal	(declined)
10/2005 – unsolicited CBET proposal	(declined)
11/2005 – NER proposal	(declined)
11/2005 – NIRT proposal (co-PI)	(declined)
01/2006 – MRI proposal	(declined)
03/2006 – unsolicited CBET proposal	(awarded)
05/2006 – NUE proposal	(awarded)
07/2006 – 2nd CAREER proposal attempt	(awarded)
09/2006 – unsolicited CBET proposal	(awarded)

The City College of New York

General Advice for Career Proposal

- every division/every panel is different
- propose a doable set of projects for both short and long-term (remember, they know how much a 1st or 2nd year student can get done)
- be concise – the project summary is the most important part, it sets the stage
- a timeline is a MUST
- use subheadings to make it easier for the reviewer to find things during the panel discussion
- use italic, bold or underlining strategically, **but** sparsely
- show your track record & infrastructure
- collaborators (can be used to support proposal, but should not dominate proposal)

Enjoy what you do! Good Luck!

NSF CAREER Award Bootcamp

LINDA VIGDOR, MFA, PhD

CUNY
ADVANCED
SCIENCE
RESEARCH
CENTER

What IS a bootcamp for NSF Career Awards?

CUNY ADVANCED SCIENCE RESEARCH CENTER

- A structured, guided, and ***intensive*** program
  - proposal strategizing
  - grant writing
  - peer feedback
- Specifically targeted to address the CAREER RFP
- Two separate bootcamps for the 2017 competition
  - First-time submissions – approx. 14 weeks, to start March 29 & 30
  - Resubmissions - approx. 12-14 weeks, to start March 28
- Each week will include
  - A presentation about a specific aspect of the CAREER proposal
  - Time for group discussion / constructive criticism of drafts

Purpose

CUNY ADVANCED SCIENCE RESEARCH CENTER

- To help faculty understand and practice strategies for designing and writing a competitive proposal
- To advance the competitiveness of CUNY grant proposals
- To advance ASRC's mission to support CUNY researchers

Expected Bootcamp Outcomes

Participants should

- Understand the components that make up a competitive grant proposal
- Be better able to write to the targeted audience as well as to both explicit and ambiguous review criteria
- Gain an appreciation for the mindset and timeline needed to write a competitive proposal
- Practice giving constructive critical feedback to peers
- Develop strong grant writing skills
- Produce and submit a competitive CAREER proposal

‘Bootcamp’ Expectations of Participants

CUNY ADVANCED SCIENCE RESEARCH CENTER

- Self-assess readiness to apply for the CAREER Award
- Commit to attending all bootcamp sessions (discuss exceptions with Linda)
- Commit sufficient time to writing your proposal – **there will be homework!**
- Commit to providing support and constructive feedback to bootcamp participants
- Practice good research ethics

Key Topics for first-time submissions group

CUNY ADVANCED SCIENCE RESEARCH CENTER

- Deep analysis of the CAREER RFP
- Articulating the basis of your idea – what, why, and how
- Understanding review criteria and writing to the specific audience: Reviewers & Program Officers
- Time management – creating time/space to write drafts & revise, revise, revise
- Writing the specific proposal sections
- Integrating sections into a cohesive whole and compelling story/argument
- Peer reviews
- Supplemental documents

Key Topics for resubmissions group

CUNY ADVANCED SCIENCE RESEARCH CENTER

- How to do a post mortem on a proposal
- Review criteria and writing to a specific audience
- Section by section revisions – addressing reviews
- Giving and receiving constructive feedback
- Making the idea / proposal a compelling story
- Peer review

How to Participate (all meetings at ASRC)

CUNY ADVANCED SCIENCE RESEARCH CENTER

- Contact Linda: linda.vigdor@asrc.cuny.edu
- Resubmissions Bootcamp
  - Meets: Tuesdays, 6:30 – 9 PM
    - A few slots are available in this group
- First-time submission bootcamp is almost full
  - Meets: Wednesdays, 3:30 – 6:00 PM
    - First meeting is March 29
    - Very few slots may be available in this group
- Mini bootcamp (for those who make the Wed meeting)
  - Slides to be emailed
  - Shorter face-to-face meeting to discuss questions and proposal section drafts
    - Thursdays, noon – 1:30 PM
    - Slots are available in this group

Faculty Early Career Development (CAREER) Program

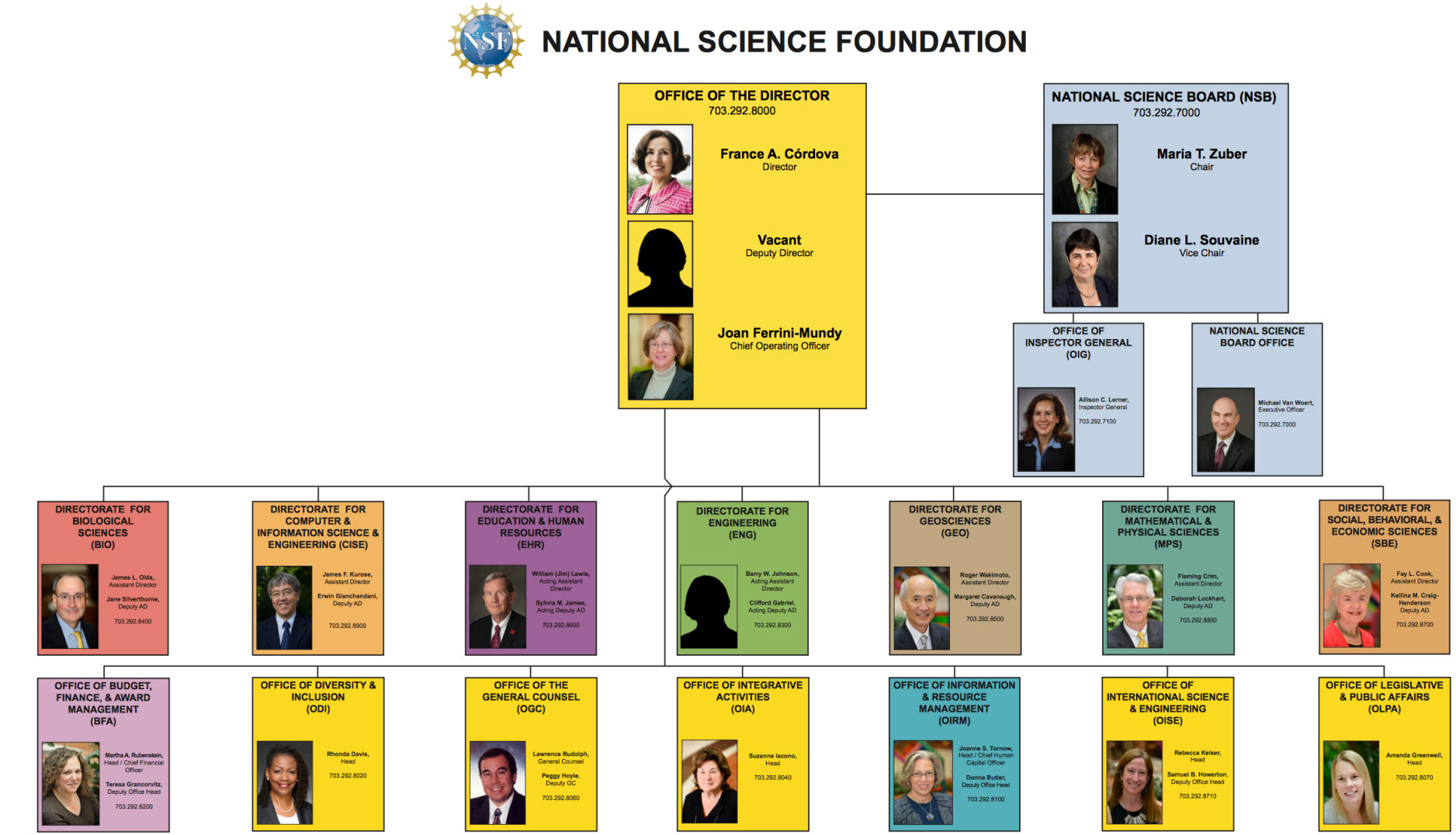
Program Solicitation – NSF 17-537

Rosemarie D. Wesson, Ph.D., PE
Associate Dean for Research
The Grove School of Engineering
The City College of New York

Many Thanks to: Sonia Esperança, Ph. D. - Division of Earth Sciences and Member, CAREER Coordinating Committee

http://www.nsf.gov/career

NATIONAL SCIENCE FOUNDATION



National Science Foundation
4201 Wilson Boulevard
Arlington, Virginia 22230
TEL: 703.292.5111 | FIRS: 800.877.8339 | TDD: 800.281.8749

February 2017

CAREER Program Website
www.nsf.gov/career

New Solicitation

NSF-wide

Faculty Early Career Development Program (CAREER)

CAREER and PECASE Information

May 26, 2016 NSF CAREER Program Webinar

Presentation slides from May 26, 2015 NSF CAREER Program Webinar

CONTACTS

CAREER Directorate and Division Contacts:
http://www.nsf.gov/crssprgm/career/contacts.jsp

PROGRAM GUIDELINES

Solicitation 17-537

Important Information for Proposers

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 17-1), is effective for proposals submitted, or due, on or after January 30, 2017. Please be advised that, depending on the specified due date, the guidelines contained in NSF 17-1 may apply to proposals submitted in response to this funding opportunity.

Proposal due dates:

Directorate	2017 due dates	2018 due dates	2019 due dates
BIO, CISE, EHR	July 19, 2017	July 18, 2018	July 17, 2019
ENG	July 20, 2017	July 19, 2018	July 18, 2019
GEO, MPS, SBE	July 21, 2017	July 20, 2018	July 19, 2019

Deadlines Posted for Next 3 Cycles

Faculty Early Career Development Program (CAREER)

CAREER and PECASE Information

BOTTOM OF WEB PAGE

RELATED PUBLICATIONS

Frequently Asked Questions (FAQs) for the Faculty Early Career Development (CAREER) Program for Submission in Years 2017 - 2019 (NSF 17-050)

FAQs

RELATED URLS

NSF PECASE Recipients

NSF Outreach Activities Information

Career-Life Balance (CLB) Supplemental Funding Requests

Research Opportunities in Europe for NSF CAREER Awardees

Research Opportunities in Germany for NSF CAREER Awardees

Support for New Investigators

- All NSF programs support new investigators as part of the regular ("core") research competitions.
- About 1/3 of all NSF research proposals to NSF in 2016 were by new investigators (never funded by NSF)
- Success rates for new investigators typically lag behind those of previously funded PIs
- Faculty Early-Career Development (CAREER) Program
  - Most prestigious awards to help a junior faculty member develop activities that can effectively integrate research and education within the context of his/her organization.

Goals of the CAREER Program

- **Provide stable support for five years (≥400K in most Directorates – BIO, GEO/PLR, ENG are ≥500K) to allow the career development of outstanding new teacher-scholars in the context of the mission of their organization.**
- **Build a foundation for a lifetime of integrated contributions to research and education.**
- **Provide incentives to Universities to value the integration of research and education.**
- **Increase participation of those traditionally underrepresented in science and engineering.**

Investigator Eligibility Criteria

- Hold a doctoral degree in a field supported by NSF by proposal deadline
- Be untenured by Oct 1st following proposal deadline
- Be employed in a tenure-track (or equivalent) position at an eligible institution as an Assistant Professor (by Oct 1st following deadline)
- Have educational responsibilities at the eligible institution
- Have not previously received a CAREER award
- Have not had more than two CAREER proposals reviewed
- Untenured Associate Professors are NOT eligible

Tenure-Track Equivalency FY18 Changes

- **FY17- For a position to be considered a tenure-track-equivalent position, it must meet all of the following requirements: (1) the employing dept or org does not offer tenure-track positions to any new hires; (2) the employee is engaged in research in an area of science or eng supported by NSF; (3) the employee has a continuing appt that is expected to last the five years of a CAREER grant; (4) the appt has substantial educational responsibilities; and (5) the proposed project relates to the employee's career goals and job responsibilities as well as to the goals of the department or org.**

REMOVED

- **FY18 - For a position to be considered a tenure-track-equivalent position, it must meet all of the following requirements: (1) the employee has a continuing appt that is expected to last the five years of a CAREER grant; (2) the appt has substantial educational responsibilities; and (3) the proposed project relates to the employee's career goals and job responsibilities as well as to the goals of the department or org. As stated in the Proposal Preparation Instructions, for non-tenure-track faculty, the Dept. Letter must affirm that the investigator's appt is at an early-career level equivalent to pre-tenure status, and the Dept. Letter must clearly and convincingly demonstrate how the faculty member's appt satisfies all the above requirements of tenure-track equivalency.**

ADDED

Institutional Eligibility

- Academic institutions in the U.S., its territories or possessions, and the Commonwealth of Puerto Rico that award degrees in fields supported by NSF.
- Non-profit, non-degree-granting organizations such as museums, observatories or research labs may also be eligible to submit proposals, if the eligibility requirements of the PI's position are satisfied
- NSF encourages proposals from different institutional types, including Minority Serving and Undergraduate Institutions

CAREER or Unsolicited Proposal?

- CAREER proposals are single PI projects that include research and education activities that are integrated, innovative, and ambitious
- CAREER requires support from the Department Chair
- The CAREER goals are lofty – CAREER awards are a lot of work
- Are you at the right stage in your career to undertake the commitments of a CAREER award?
- Have you discussed your ideas with mentors, fellows, program officers?
- Have you demonstrated to others in the community that you have the commitment to both research and education?

CAREER is NSF wide

- The program started in 1996
- All Directorates/Offices participate in the program
- Proposals are submitted to program of interest
- Thousands of CAREER awards have been made over the years
- NSF Presidential Early-Career Awards in Science and Engineering (PECASE) are selected out of the pool of recent CAREER awardees

CAREER varies across NSF

(Program Expectations)

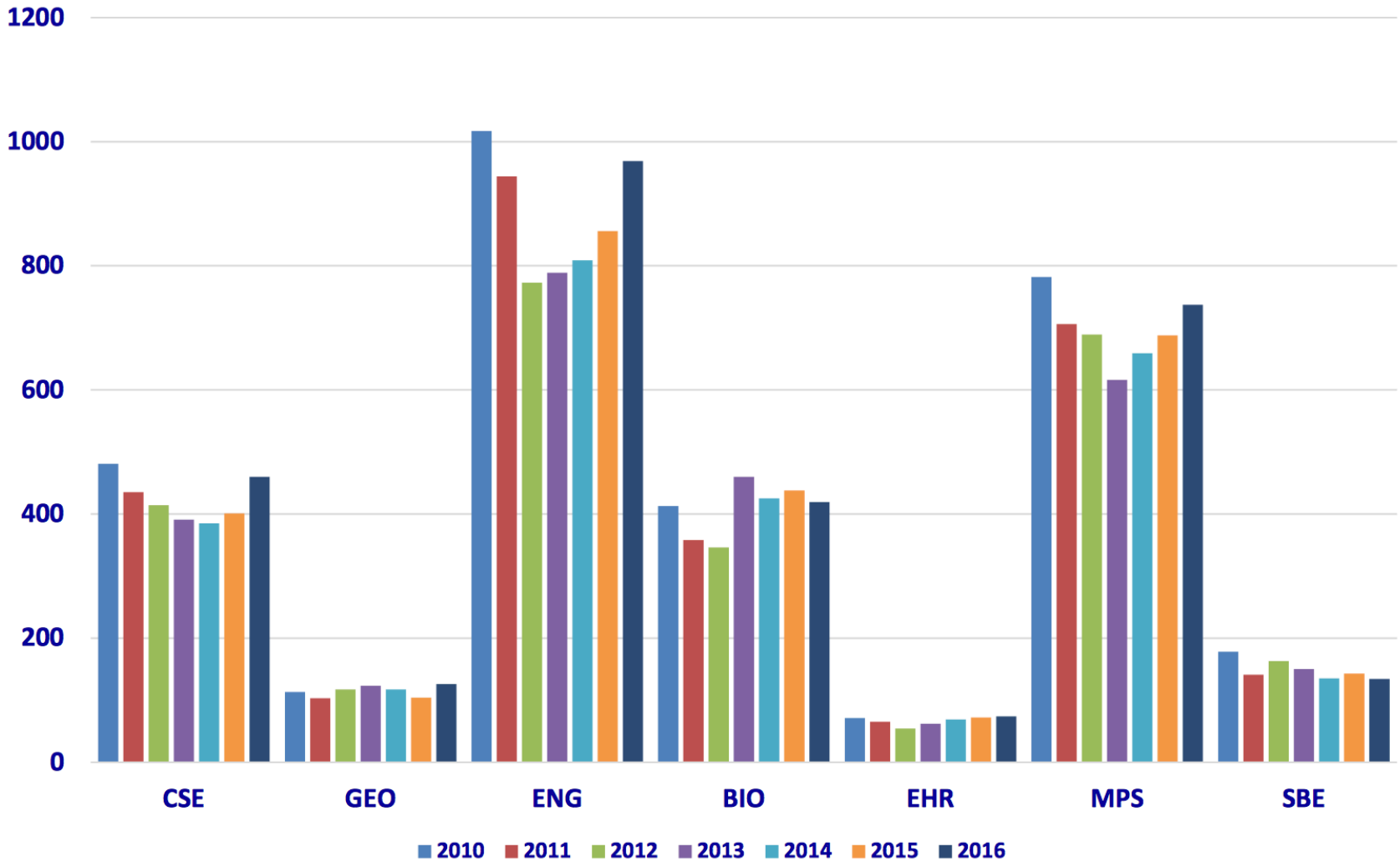
- CAREER proposals are submitted to, and reviewed by, one or more of the disciplinary programs
- Assessment of Departmental Letter plays a role in the review of the proposal
- Typical award size varies by Directorate/Division/Program
- Expectations for scope of research and education activities varies with community norms
- Talk to Division Contact(s) for additional information *(http://www.nsf.gov/crssprgm/career/contacts.jsp)*
- For interdisciplinary proposals, contact all relevant Program Directors or Division Contacts

CAREER varies across NSF

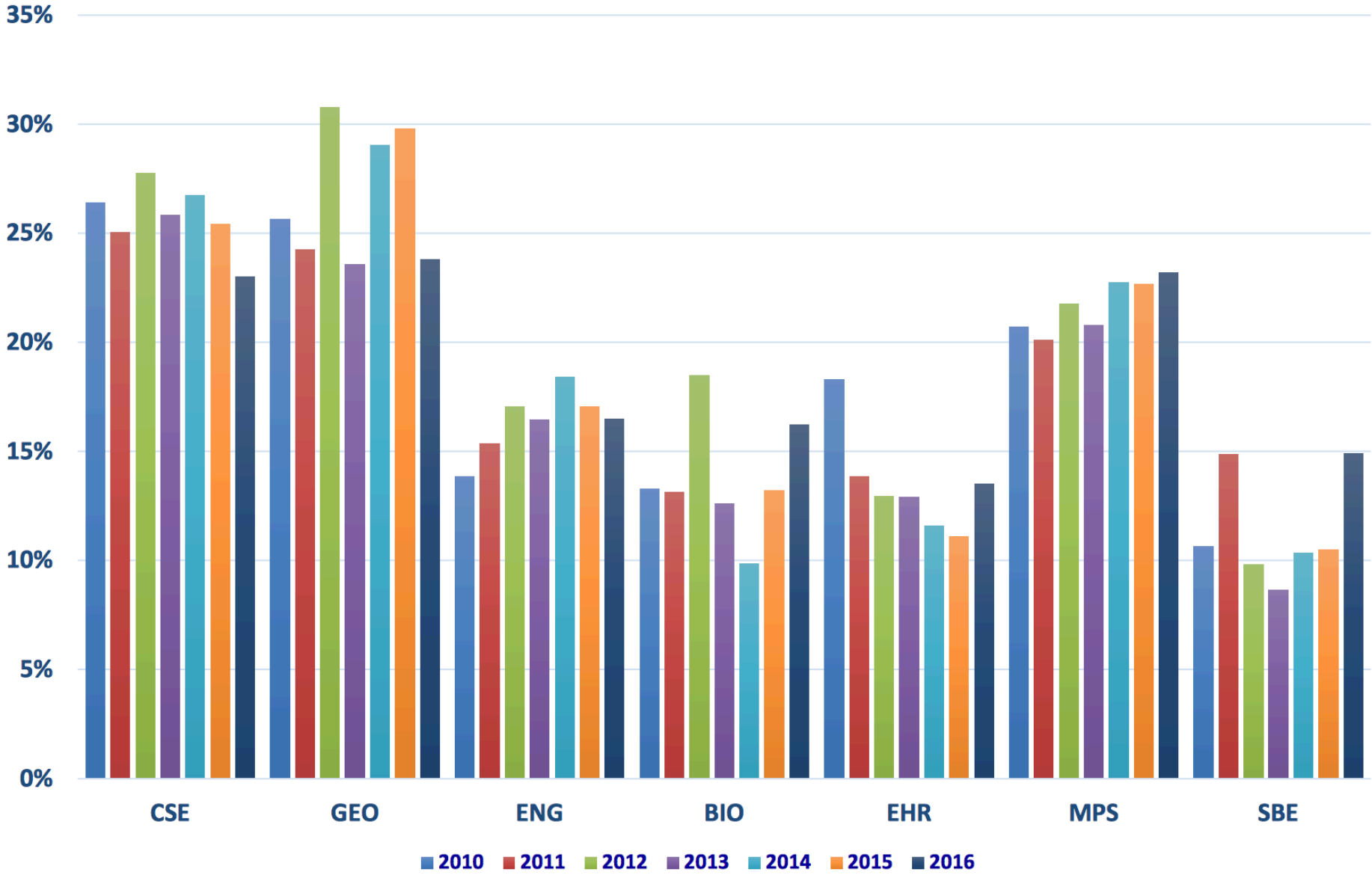
(Merit Review)

- Ad hoc + Panel (with other proposals in the Program)
  - most of GEO (AGS uses ad hoc only)
  - BIO and SBE
- Primarily dedicated CAREER Panels
  - ENG, CISE, EHR
  - MPS varies by Division:
    - ✓ AST : Panel only
    - ✓ CHE, DMR – Mix of ad hoc and panels
    - ✓ DMS – mostly panels (2 programs ad hoc only)

Number of CAREER proposals



CAREER Funding Rate



CAREER Proposal Ingredients

- A compelling research plan
- An innovative but feasible education plan
- A plan for the effective integration of both sets of activities (evaluation plan is a big plus)
- Departmental Letter demonstrating commitment to the career development of the investigator
- Letters of Collaboration (not support) when appropriate
- A budget that is consistent with the scope of the research and education activities

Project Description Section Additions FY18

- **Cross-Sector Perspectives- Proposals including entrepreneurship, industry partnerships, or policy activities. Not primary focus.**
- **Scientific Software Development – Innovative Software, Reproducibility studies, etc.**
- **Proposals Requiring Seagoing Facilities (Ocean Sciences)**

Education Component – Critical to Success!

- Your education component should be innovative but doable
- Demonstration of previous results with successful educaton activities is a plus
- Leverage activities at your institution that have relevance to your research
- Make sure the education activities are well integrated with the research or the workload may not be manageable
- State who will benefit from the proposed activities
- Demonstrate the activities will impact stakeholders
- Play on your strengths as a teacher-scholar

Integration of Research and Education

How will your research impact your education goals and how will your education activities feed back into your research?

- **Involving others (graduate, undergraduates, K-12, high school teachers, public) in your research using new tools, laboratory methods, field components, web outreach, cyber networks, etc...**
- **Partnering with those in other communities, especially those traditionally underrepresented in Sciences and Engineering**
- **Bringing the excitement of your research topics to help in the education of others**
- **Searching for new methods to deliver your research results to a broader audience than those in the immediate research community**
- **Using the broader community to gather data for your scientific pursuits ("citizen science")**

Integration of Research and Education
FY18 Changes

- **FY17-NSF recognizes that there is no single approach to an integrated research and education plan, but encourages all applicants to think creatively about how their research will impact their education goals, and conversely, how their education activities will feed back into their research.**
- **FY18-NSF recognizes that there is no single approach to an integrated research and education plan, but encourages all applicants to think creatively about the reciprocal relationship between the proposed research and education activities and how they may inform each other in their [the applicant's] career development as both outstanding researchers and educators.**

Integration of Research and Education
FY18 Changes

Sentence added:

In addition, NSF recognizes that some investigators, given their individual disciplinary and career interests, may wish to purse an additional activity such as entrepreneurship, industry partnerships, or policy that enhances their research and education plans.

Departmental Letter (2 pages)

- Commitment to the PI's proposed CAREER research and education activities
- Description of how the PI's career goals and responsibilities mesh with that of the organization and department
- Description of how the department will contribute to the professional development of the PI with mentoring and whatever is needed to forward the PIs efforts to integrate research and education
- Statement that indicates the PI is eligible for the CAREER program

Letter(s) of Collaboration

- **Project Description must document the nature of and need for all project collaborations, such as:**
  - **Intellectual contributions to the project**
  - **Permission to access a site, use instrumentation or facility**
  - **Offer to furnish samples / materials for research**
  - **Logistical support / evaluation services**
  - **Mentoring of U.S. students at a foreign site**
- **Single-sentence statement of collaboration:**
  - **"If the proposal submitted by Dr. [name of the PI] entitled [proposal title] is selected for funding by the NSF, it is my intent to collaborate and/or commit resources as detailed in the Project Description."**
  - **Must not recommend or endorse PI or project**

CAREER personnel and budgets

- Co-PIs are not allowed
- Consultants, sub-awards and other personnel are allowed and may receive support commensurate with their limited role
- Programs may support buy out of academic year time for teaching intensive institutions (check with your Program Officer)
- International activities are encouraged and may be supported by the Office of International Science and Engineering (OISE)
- Budget justification should be consistent with the scope of the science and education activities
- Some Directorates prefer making awards closer to the $400K ($500K) minimum

Grantsmanship makes a big difference

- **Does NSF fund your area of research?**
  - Search Awards in the NSF website
  - Ask funded colleagues, mentors, advisors, past rotators
  - Email Program Officers/CAREER Division Contacts
- **Know your audience - Who will read your proposal?**
  - Ad hoc reviewers are close experts in your field, whereas a panel will see your proposal from a greater distance
  - Make it easy for the reviewers to identify the merits of the project. If it is not stated in the first two pages, nobody will look for it in the next 13 pages
  - Write accurately, concisely, logically, clearly.
  - Make sure at least one person reads your proposal before you submit it. NOT your SRO!

Tips for putting your best foot forward

- Start early and take advice from mentors, advisors
- If revising a declined proposal, pay attention to what reviewers and PO said
- Be aware of the scope - not too ambitious or too narrow
- If you identify potential pitfalls of the research plan, address them in the proposal or reviewers will pick it apart for you
- Capture the reviewers' interest at the beginning of the proposal or you may lose them forever

Most Common Mistakes made by PIs (Intellectual Merit)

- Work is too close to what has been done before - i.e., Incremental advance
- Techniques and methodology are not cutting edge
- Project has too large a scope or is too narrowly focused to be exciting
- Proposed methods/research plan are not likely to yield results that will address the stated goals of the project
- The experiment/theoretical/analytical design is flawed
- Resources not available or PI does not have demonstrated expertise in it

Most Common Mistakes made by PIs (Education Component)

- Education component is generic and what is expected of any PI in your field - one more student is not enough!
- Unrealistic education activity - "will impact K-12 education in the state of X"
- Reinventing the wheel - another blog, another website
- Research and education plans are not aligned or integrated – *"parallel lines that will never intersect"*
- Lack of understanding of what is effective in education - literature search helps here too – Scholarship of the education component
- Not highlighting Broader Impacts that go beyond education

Comments you do not want to see in reviews

- This is a solid but not particularly original study that stomps on old ground
- The results of this study will have limited impact in the field as the techniques/approaches are outdated
- The PI has not been very productive either during or since his Ph.D.
- This proposal is naive/overly ambitious
- The PI has not demonstrated expertise in this methodology

Declination is part of the game

- **Stay Calm and Do NOT Get Discouraged!**
  - Breathe deeply and read the reviews more than once
  - Ask others to interpret the reviews for you
  - Contact the PO only after you have had time to digest the feedback (Reviews, Panel Summary, PO Comment, Context Statement) and reflect on your next move
- **Resubmit only after addressing significant weaknesses**
  - Do you need more preliminary data?
  - What were the common themes in the reviews?
  - Is one component better than another?
  - Did anyone identify a significant strength that you could build upon for resubmission?

The CAREER website – www.nsf.gov/career

- Latest Program Solicitation - NSF 17-537
- Frequently Asked Questions - NSF 17-050
- CAREER Directorate/Division Contacts
- Link to recent awards
- Link to PECASE awards
- Link to Research Opportunities in Europe (ERC, DFG)
- Career-Life Balance Supplement Opportunities
- Next Deadlines
  - July 19, 2017 - BIO, CISE, EHR
  - July 20, 2017 - ENG
  - July 21, 2017 - GEO, MPS, SBE

Back-Up Slides

Traits of Successful CAREER proposals

- CAREER proposals should match the expectations in the disciplinary programs in terms of research and education - This is a highly competitive program!
- Written with peer reviewers (Ad Hoc and/or Panel) in mind - Ask your Program Officer who will be assessing your proposal
- Appropriate scope of education and research activities. It is a 5-year plan, not your whole life
- Goes outside the education box of regular research proposals in your field
- Strikes a balance between doable research activities and more risky pursuits

CAREER Urban Myths

- "You cannot apply because you have another award"
- "It is an entry program, so apply to CAREER first"
- "I need to see a successful proposal to write a successful proposal"
- " I read on the web that to succeed, I have to...."
- "CAREER proposals are more portable"
- "The education component does not matter"
- "You have no chance, if you are not from a research-intensive institution"

The Proposal Process

- Proposal is prepared using guidelines from the Grant Proposal Guide (GPG) and Program Solicitation
- It is submitted and is deemed compliant
- It undergoes merit review

How a decision is made:

- Program Officer balances the recommendation of reviewers/panel against their portfolio
- Program Officer recommends award or decline
- Division Director concurs with the recommendation

Submitting a Compliant Proposal

- Read Program Solicitation and FAQ's @www.nsf.gov/career
- Start your preparation as early as possible (late submissions will be returned without review - RWR)
- Pay attention to the details and mechanics
- Get feedback from mentors, if needed
- Contact your Chair for Letter (proposals without this will be RWR)
- Letter of Collaboration only in supplementary documents (NO Letters of Support - they will be removed or RWR)
- Make sure to download and keep a copy of the submitted proposal and check for problems with the PDF
- File changes/updates can be made ONLY up to the deadline (no excuses accepted)

NSF Merit Review Process

All CAREER proposals at NSF require at least three external evaluations before the Program Officer can take an action to recommend an award or declination

Evaluation can be done by either:

- **Ad Hoc reviewers only**
- **Panel Review Only (panelists write reviews before the panel meeting)**
- **Combination of both Ad Hoc and Panel Review**

Reviewer Selection

- **The ad hoc/panel reviewers:**
  - **have specific content expertise**
  - **have general science or education expertise**
- **Sources of ad hoc/panel reviewers:**
  - **Program Officer's knowledge of the research area**
  - **References listed in proposal**
  - **Recent professional society programs**
  - **Computer searches of journal articles related to the proposal**
  - **Investigators are encouraged to:**
    - **Suggest persons they believe are especially well qualified to review the proposal**
    - **Identify persons they would prefer not review the proposal**

Five Review Elements

1. What is the potential for the proposed activity to:

a. advance knowledge and understanding within its own field or across different fields (**Intellectual Merit**); and

b. benefit society or advance desired societal outcomes (**Broader Impacts**)?

2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts

3. Is the plan for carrying out the proposed activities well-reasoned, well organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success

4. How well qualified is the individual, team, or institution to conduct the proposed activities

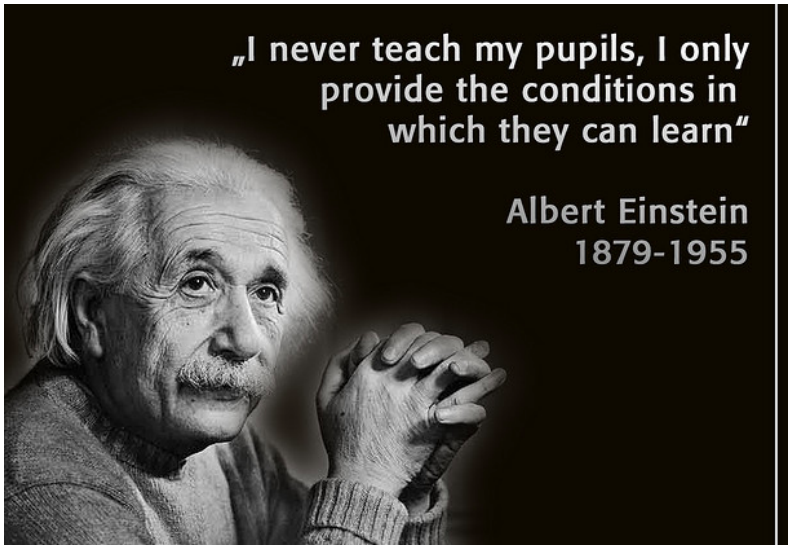
5. Are there adequate resources available to the PI (either at the home institution or through collaborations) to carry out the proposed activities?

Basis for the decision

- **Peer Review**
  - Content of the review is more important than rating
  - Program Officer analyzes: Fairness and substance of the reviews; any technical issues raised (can they be resolved swiftly and easily); reviewer's enthusiasm for the project; any additional feedback from reviewers/panels or other program officers; sometimes also clarification from the PI if needed
- **Portfolio Balance**
  - Research and education topics and their integration; potential for transformative impact in both; priority or timeliness of the area of research and systems; demographics of the PI population and diversity of institution types; stage of the career development of the PI; international partnerships

Strengths of Highly Competitive Proposals

- **NOVEL IDEA/RESEARCH QUESTION**
- **WELL WRITTEN**
- **WELL JUSTIFIED**
- **RESEARCH PLAN THAT CAN ADDRESS THE QUESTION**



- "Imagination is more important than knowledge."
- "If we knew what it was we were doing, it would not be called research, would it?"
- "The most beautiful thing we can experience is the mysterious. It is the source of all true art and all science."
- "Any intelligent fool can make things bigger and more complex... It takes a touch of genius --- and a lot of courage to move in the opposite direction."

The Idea/Research Question

- **Ask yourself and convince reviewers**
  - What do you intend to do that others want to know?
  - Why is the work important, innovative and exciting?
  - What has already been done and why is your way better?
  - How are you going to do the work to answer the question uniquely?
- **Prepare yourself and demonstrate knowledge**
  - Literature survey and discussions with others
  - Get preliminary data for research and education components
  - If you do not have access to the best facilities, who will you collaborate/partner with?

Comments on Meritorious Proposals

- The proposed activity has the potential to transform the way others will view this problem in the future
- The broader impacts are exceptional and add another dimension to what the community is doing in this area
- The PI is incredibly productive, creative, incisive
- The PI is a new leader in this field of research
- This is the best proposal I have seen in many years reviewing for NSF
- WOW!!!

First impressions do play a part

- This is a proposal and not a manuscript - Know the difference
- All parts of the proposal have a role to play in communicating your ideas to the reviewers and POs
- Do not compress the font or squeeze the margins - use your 15 page Project Description wisely
- Embed the figures correctly and make it look good on the page
- Demonstrate that the care you took with this proposal will translate in the way you perform your research and manage your education program
- If you cannot write well - Take a class!