

# GRANT WRITING WORKSHOP-

## Biology

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TALK IS POSTED AT:

[www.cudenver.edu/~bstith](http://www.cudenver.edu/~bstith)

# Ami Ahern-Rindell

- Reviewer:
  - NSF Graduate Fellowship Program
  - NSF ILI (instrumentation)
  - NSF CCLI (course, curriculum, laboratory improvement)
- Grants from:
  - NSF ILI (1993, 1998)
  - Kresge
  - Murdock Charitable Trust

# Brad Stith

## ~\$1.8 mil GRANTS FROM:

- NSF: CELL BIOLOGY & IBN ANIMAL DEVELOPMENTAL MECHANISMS
- LIPHA (FRENCH PHARMACEUTICAL CO)
- NIH AREA

## PANELS:

- NSF CELL BIOLOGY (SIGNAL TRANSDUCTION)
- CCLI
- Collaborative-RUI

# Funding Sources for Primarily Undergraduate Institutions (PUIs):

1. National Institutes of Health (NIH)
2. National Science Foundation (NSF)
3. Other...Industry, Private Foundations

# Funding:

- esp. if there is no undergraduate research funding from your administration,
- Set up a student research club (our student clubs receive up to 15,000 a year from student fees). Equipment marked “research club” and could be pooled. Collect preliminary data for a big grant.

# 1. NIH AREA Program

- Has averaged ~33% funding
- AREA budget typically 1000<sup>th</sup> of the total NIH budget (25 billion → 25 million)
- Only medical
- Typically 3 years, \$50K each year
  
- Also, **RO3 program** for “risky” research
- Only two years
- \$50K each year

## 2. NSF funding for PUIs

- RUI; individual research grants for PUI faculty; used to be 32% funding level, but now ...?--not a separate pot of money
- Collaborative RUI- gone this year
- REU Site – Group of 5-10 faculty members, separate pot of money, ongoing
- CCLI – separate pot of money, ongoing, research grade equipment for teaching
- See: **ADVICE FOR GRANT WRITERS: A Guide for Proposal Writing [nsf9891]**  
<http://www.nsf.gov/pubs/1998/nsf9891/nsf9891.pdf>

# RIG or Career Advancement Award (05-581)

- One time
- New (one year old)
- 2 years, \$175,000
- Basic Science
- Large participation in science;  
underrepresented minorities
- High success rate

New NSF program (deadline was April):  
NSF Scholarships in Science,  
Technology, Engineering, and  
Mathematics (S-STEM)

This program makes grants (\$100K) to institutions of higher education to support scholarships for academically talented, financially needy students, enabling them to enter the workforce following completion of an associate, baccalaureate, or graduate level degree in science and engineering disciplines.

# At the NSF, “BROADER IMPACTS” crucial

## HOW DOES YOUR PROPOSAL:

([www.nsf.gov/pubs/2002/nsf022/bicexamples.pdf](http://www.nsf.gov/pubs/2002/nsf022/bicexamples.pdf))

- promote teaching, training?
- involve underrepresented gender, ethnicity, disability, geographic, etc?
- enhance infrastructure (facilities, instrumentation, networks, partnerships)?
- how disseminate?
- benefit society? See NSF GPRA Strategic Plan 2001-2006 and web site: [www.nsf.gov/od/opp/opp\\_advisory/oaccrit2.htm](http://www.nsf.gov/od/opp/opp_advisory/oaccrit2.htm)

## Broader Impacts cont'd

### Promote teaching, training?

- **From K-grad school**
- **Hands-on activities for students**
- **Involve K-12 and/or college teachers**
- **Student presentations at natl/local meetings**
- **Grad/PostDocs involved in teaching**
- **Develop/disseminate novel “pedagogic approaches to teaching”**

involve underrepresented gender, ethnicity, disability, geographic, etc?

- **How involve minorities in lab/educational activity?**
- **Work with minority institutions?**
- **Research collaborations with teachers/researchers at minority institutions?**
- **Visits to minority institutions (“Campus visits”),**
- **Workshops, conferences where “diversity is a priority”**
- **How disseminate to minority faculty/students?**

enhance infrastructure (facilities,  
instrumentation, networks,  
partnerships)?

- **Is equipment not currently available**
- **Why is equipment needed?**
- **Who would use equipment (in a collaboration? would students use equipment? faculty from other dept/institutions?)—” multiuser”**
- **Would you develop new techniques with equipment?**
- **CCLI....**

# how disseminate?

- **Partner with museums, nature/science centers, schools**
- **Use lay presentations/exhibits at libraries, radio/TV, museums**
- **Present data on web, on CDs**
- **Conferences, workshops**

# benefit society?

- Document improvement of schools, student education, etc .....record when your students go on to med or grad school, do anything outstanding, etc.).
- Prove the value of your program! Use letters from students stating that working in your project/lab facilitated entry into grad school, understand a lecture topic, development of their presentation skills, or get a better job, etc.
- Partner with federal, state or local governmental agencies to affect change in policies
- Disseminate to the lay person

# Esp impt for CCLI or Program grants:

## “EVALUATION/ASSESSMENT”

- **SEE NSF BOOKLETS:**
  1. **2002 User-Friendly Handbook for Project Evaluation**  
(<http://www.nsf.gov/pubsys/ods/getpub.cfm?nsf02057>)
  2. **User-Friendly Handbook On Mixed Methods**  
(education)<http://www.nsf.gov/pubsys/ods/getpub.cfm?nsf97153>
  3. **User-Friendly Handbook for Project Evaluation:  
Science, Mathematics, Engineering and Technology  
Education** .  
<http://www.ehr.nsf.gov/EHR/RED/EVAL/handbook/handbook.htm>
- **IMPT: include a faculty member who specializes in program evaluation (in EDUCATION OR a PSYCHOLOGIST)**

# Do you know the Value of YOUR INSTITUTION?

## Actual text you can use....

- **“liberal arts colleges and small universities that focus on undergraduate education have been hiring science faculty at record rates the past few years. Educators say this trend is one of the many signs of research vitality at these small schools, which TRAIN A DISPORTIONATE SHARE OF THE NATION’S SCIENTIFIC WORKFORCE COMPARED WITH THE BIG RESEASRCH UNIVERSITIES.**
- **SOURCES: Academic Excellence, [www.rescorp.org](http://www.rescorp.org); SCIENCE, 13 JULY; 293:193, 2001, the NSF report "Undergraduate Origins of Recent(1991-95) Science and Engineering Doctorate Recipients" (NSF 96-334) [<http://www.nsf.gov/sbe/srs/nsf96334/start.htm> ]**

- **"When productivity is taken into account, several liberal arts colleges rank with research-intensive universities for number of bachelor's degree recipients who go on to earn a S&E doctorate. One report indicated that 15 of the top 25 institutions-ranked by the proportion of the baccalaureate recipients who earned doctorates in the sciences between 1951 and 1980-were liberal arts colleges.[Sam Carrier and David Davis-Van Atta, Maintaining America's Scientific Productivity (Oberlin, OH: Oberlin College, 1987)] Similar findings were also presented in a report on "Persistence in Higher S&E Education." [ Betty Maxfield, Persistence in Higher Science and Engineering S&E Education: S&E Baccalaureate to S&E Doctorate Production (Washington, D.C.: Library of Congress, Office of Technology Assessment, 1988)]**
- **By field, baccalaureate colleges provided the baccalaureate education of 15 percent of science doctorate holders, almost four times the proportion found among engineering doctorate holders (chart 3). These institutions play a significant role in the baccalaureate origins of recent doctorate recipients in chemistry, mathematics, social sciences, psychology and biological sciences (table 4)."**

# HOW DO YOU START WRITING?

1. **First line: OBJECTIVES**
2. **then in the next short paragraph state “central aim of this project is to test...”**
3. **Then, state the only A FEW goals.**
  - **“Lacks focus” is a typical comment (esp new grant writers). Your first draft can have all that you believe that is important and interesting, THEN cut until it hurts, leaving only 3 specific aims (or less) that are highly related.**
  - **Of the total 100 grants (range of 80 to 120), one panel member may read about 15 grants=huge amount of work-days of reading. KEEP YOUR PROPOSAL SIMPLE! Panel member probably not in exact same field...but some are.**

- **List evidence supporting your idea or model (set up a house of cards), then say this evidence is not sufficient (knock over the house of cards), say you will test it “explicitly with the following experiments:”**
- **Emphasize methods/field that you are familiar with; what you have been trained in- you should be an expert. If you have not done the method, find someone who has and get a letter**

# PARAGRAPH ORGANIZATION

(this way you can reference with “(see II.3.a).”

For example:

## I. TITLE HERE

I.1 first section, paragraph

I.1.A. for next paragraph

I.1.B. for second paragraph

I.2 second section

## II. TITLE HERE

- **READ IT ALOUD TO YOURSELF**
- **If you do not include “possible problems and their resolution,” you may get the comment “the PI has not thought this through...”**
- **this section can also do massive damage-- always suggest solution but...**

# HAVE SOMEONE READ YOUR APPLICATION

- They look for gaps in logic or steps
- Someone inside your field
- Someone outside your field
- Give them lots of time
- Utilize CUR reader service....
- Attend the CUR Proposal Writing Workshop (yearly)

- Are there **OTHER GRANTS** already given in your area? (how much did they get? what are they doing- is it the same as i suggest?); **NIH AND NSF SEARCH ENGINES**

Ask other Faculty Members (use CUR listserv?) for their old successful grants

- **IF RESUBMISSION:**

- **OUTLINE, NEAR THE BEGINNING, THE PRIOR CRITICISMS AND YOUR RESPONSE (YOU MAY GET THE SAME REVIEWER WHO WILL GET MAD IF YOU DO NOT ADDRESS PRIOR CRITICISMS).**
- **THANK THE ORIGINAL (idiot) REVIEWERS FOR SPENDING THEIR TIME IN REVIEWING (even tho they did not know what they were talking about)**
- **a new reviewer will wonder why you are spending time going over these specific unimportant points-note “response to prior review”**

- **Hypothesis-driven? Not purely descriptive?**
- **PLANNING: Draw out expected results (gels: what lanes look like, controls needed, figures, etc)-not in grant but helps troubleshoot**

## **Important for NSF:**

- **Get to know Program Officer at the funding agency (NSF, NIH, etc). Email, Call them, Stop by agency (without pestering)**
- **Email Program Officer a brief summary of your application; they may suggest changes, where to go for money...**
- **Out of 100 grants, about 12 will be in the “grey area” for funding and the administrator can have much input in these after the panel adjourns.**
- **Ask the PO to review grants (panels review ~200 grants per year...)**

- **TOUGHEST: Is problem exciting, important & of general interest?**
- **One of the biggest PUI problems: NOT ENOUGH PRELIMINARY DATA**
- **Use your classes to collect preliminary data....**
- **Desktop publishing required!**  
**(Integrate graphs, use color now...)**

## **OLD DAYS: Last minute submission....**

- **are avoiding last minute crunch- may have trouble uploading to FASTLANE or Grants.gov**
- **Buy and use Adobe Acrobat (to make your own PDF files...)**
- **Watch out for Mac problems with NIH/NSF grant files (formatting...)**

- **ILLUSTRATE PROCEDURES WITH FLOW CHART**
- **INCLUDE TIME TABLE**
- **You can choose who should AND who should not review your proposal- NSF vs. NIH**

- To fight grant reviewer's assumption that you don't know how to do anything, OBTAIN LETTERS OF COLLABORATION OR SUPPORT FROM BIG RESEARCH LABS.
- 10 APPLICATIONS= 1 GRANT FUNDED. KEEP TRYING.
- Most important characteristic of a grant getter??? BE ABLE TO WITHSTAND REJECTION.
- GET A HOBBY FOR STRESS RELIEF. FIGHT BURNOUT.

- **COMMON REVIEWER CRITICISM: “I HAVE DONE THAT TECHNIQUE AND IT IS NOT AS SIMPLE AS THE PI SUGGESTS”**  
    **”IT WILL NOT WORK BECAUSE...”**—  
value of preliminary data AND letters of collaboration.
- **DEVELOPMENT OF NEW TECHNIQUE VERY DANGEROUS FOR PUI RESEARCHER**
- **APPLY PROVEN TECHNIQUE IN NEW UNIQUE SITUATION**

# BUDGET ADVICE

## MATCHING FUNDS:

- **REQ FOR EQUIPMENT?**
- **A COURSE RELEASE?**
- **PAY FOR IMPROVEMENT OF FACILITIES?**
  
- **Describe evidence of “INSTITUTIONAL SUPPORT” (release time for faculty? Intramural support? Setup money? Lab space? Lab refurbished by university? NSF will not set up your lab per se)**

# BUDGET ADVICE

- **Suggest 1-3 students at \$6-7/hr, up to 20 hrs week in academic year-more in summer (\$1000-3000 for 2 months effort)**
- **Ms. Graduate student salary \$10,000/ yr. (May be paid to undergraduate). Ph.D. STUDENTS EARN \$18-28 k/YEAR.**
- **My undergraduate and Ms. Student salary budget has been as much as \$20,000 / yr.**
- **Add in two months (or more) salary for PI (if not, reviewers criticize this).**

- **If equipment >\$5000 requested: note copay by university.**
- **You need to carefully define what will be done with the equipment (for CCLI, go through lab exercise, what student learns, involve inquiry based lab).**
- **How many other departments or faculty can use the equipment? Teaching use?**
- **Do you need a staff person to run the complex equipment?**
- **Maintenance contracts?**
- **How/ does learning how to use the equipment help students get a job in industry, or go to grad sch?**

# TIME IS YOUR MAIN FOE

- **TECHNICIAN-** Half time or full(full: \$22-25 k/yr, over \$30k for experienced research associate).
- OR INCLUDE A “TEACHING POST-DOC”  
(No teaching experience, but lot of research experience –will work in your lab partime)
- Can you share a research assistant with another lab?
- **COLLABORATIONS** are encouraged by the nsf...but

## **Remember to allow for time before the deadline**

- to scan in letters of collaboration or photos (some scanned images such as pict files work in Word but are not accepted by NSF—you only find this out when you view the NSF version of your files)...**
- Uploading to NSF/NIH can take time...**
- For all funding sources: goal would be to finish your first decent draft a month a head of time. You can upload it to the NSF at this time and then print off from the NSF web site (does the printed version look correct? check to make sure that your formatting got to the NSF intact). Then you can work on individual sections over the next period of time.**

- **Can you submit an update? The NSF allows 1-2 pages (so your grant is extended by two more pages!) (check with your program officer about this and the date for submittal).**
- **Close any loopholes that occurred to you after submittal or collect any data that you could not collect in time for the original submission.**

**GOOD LUCK!**