



BIOLOGY NEWS

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Message from the Biology Division Chair



*Karen Resendes
at the "Bean"
during the ASBMB
conference in
Chicago*

Welcome to the Winter 2018 edition of the CUR Biology Division Newsletter! The CUR Biology Division has been working hard on its ongoing and new initiatives throughout the fall semester. The Student Travel Award Committee has selected its fall awardees, and the call is out now for the spring awards. We

continue to advocate the mission and objectives of CUR at society meetings (keep an eye out for our poster at ASCB in early December and at ASBMB this spring), and we are beginning the rollout of the new MIRIC (Mentoring the Integration of Research into the Classroom) initiative. Information on this program can be found on the CUR website under special projects. Finally, remember you have a voice in determining CUR Biology governance. Councilor elections open in January 2018. Be sure to vote for the individuals you want to represent your interests in CUR Biology!•

About CUR's Biology Division

The Biology Division of the Council on Undergraduate Research provides networking opportunities, activities, and resources to assist biology administrators, faculty members, students, practitioners, and others in advancing undergraduate research.

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Council on Undergraduate Research

Authentic Research: Institutional Context

Larry Wimmers (Towson University)

Towson University (TU) is a large, comprehensive in the Baltimore metropolitan area. TU has a large traditional biology major (with approximately 900 majors) as well as two smaller interdisciplinary majors—molecular biology, biochemistry, and bioinformatics (with approximately 150 majors) and environmental sciences and studies (with approximately 150 majors). Students in all three majors participate in the course described.

TU's Department of Biological Sciences has increasingly been adding Course-Based Undergraduate Research Experiences (CUREs) to the traditional one-on-one faculty-student collaborations activities in an effort to broaden participation in authentic research. That effort has included our introductory class in cellular biology and genetics for some years.

The current project focuses on the gut microbiome. Numerous recent studies have linked the gut microbiome of animals to a variety of physiological and even cognitive parameters (Shreiner, A. B., J. Y. Kao, and V. B. Young, 2015. *The Gut Microbiome in Health and Disease. Current Opinion in Gastroenterology* 31: 69–75). In the introductory lab, students isolate and quantify DNA from fecal matter. The DNA in fecal matter comes in part from the animal itself, via sloughed gastrointestinal cells, but also includes a representative sample of the bacteria and fungi living in that gastrointestinal tract. The students use PCR to amplify a portion of the microbial 16S ribosomal RNA gene. This portion of the 16S rRNA gene includes areas that are so highly conserved that one set of PCR

primers will amplify the gene from essentially all bacteria but also a variable region that can be used to discriminate between species. Those amplicons are then “indexed” by the addition of a unique set of sequences to the ends of each and a mixture of all the amplicons is sequence. Students receive a report for each animal indicating the types of microorganisms present and in what proportions they are present for each animal.

We have collected a large inventory of animal fecal samples from a variety of sources, including the students' own pets. Each sample is associated with demographic and health information from the animal such as species, age, size, gender, diet, medications, exercise, etc. Each group of four students chooses samples from different animals and thus decides what types of correlations to look for. Examples include comparing dogs of the same gender and bred with identical diet but dramatically different ages, obese and non-obese dogs, and horses fed identical diets with the exception of probiotics.

The project is somewhat technically challenging. Approximately 50 percent of the samples each semester fail to amplify or do not provide useful sequence information. To address this issue, we also maintain a database of successful sequencing runs identified to specific samples. After the students receive their sequencing results, they are free to go to that database to supplement their own.

This project is not expensive when carried out with large numbers of students. We use commercial DNA extraction, concentration, and PCR clean-up kits. Our laboratory fee structure of \$25/student covers all of those supplies as well as the

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sequencing costs. Access to equipment such as microcentrifuges, thermal cyclers, and a fluorometer is necessary. We have been fortunate to be able to borrow equipment from research labs in the department and to purchase some items with generous funding from the college's Jess and Mildred Fisher endowment.●

CUR Annual Business Meeting Summary

Aaron Putzke (Whitworth University)

CUR Councilors and Executive Board members converged on the High Country Conference Center on the campus of Northern Arizona University in beautiful Flagstaff for the 2017 CUR annual business meeting. The Biology Division welcomed four new Councilors: Roslyn Crowder (Stetson University), Erin O'Brien (Dixie State University), Aaron Putzke (Whitworth University), and Daniel Westholm (The College of St. Scholastica), and honored outgoing Councilors Terry Conley (Cameron University), Nitya Jacob (Oxford College of Emory University), and Michael A. Palladino (Monmouth University). We are especially grateful to Palladino for his many years of service to CUR, including as division chair and Executive Board member. We are excited to have Karen Resendes (Westminster College) step into the division chair and Executive Board member roles.

The majority of the meeting focused on two main themes. The first involved a governance change in the make-up of the Executive Board of CUR, with the goal of reducing the size of the board to increase efficiency and effectiveness. The second issue focused on increasing membership,

visibility, and influence by working more on advocacy at the national and regional levels. We discussed this at length in the Biology Division meetings, looking at ways to not only increase membership but also to empower the current membership.

Of course, we had some fun, and all went out for a group dinner on Saturday night to a local brew pub for some relaxing conversation before the final session and travel home on Sunday. It was a great meeting in Flagstaff, and we all look forward to working hard for the Biology Division in the coming year. We hope to see you at NCUR 2018, CUR Dialogues, and/or a CUR institute!●

Lonnie Guralnick Named as CUR Representative to the Plant Science Research Network

Lonnie Guralnick (Roger Williams University) was nominated and selected as the CUR representative to the Plant Science Research Network (PSRN). The PSRN is a network of many scientific societies and organizations with a mission to build plant science research. Guralnick will be a steering committee member and will work on the National Plant Systems Initiative (NPSI). The NPSI has begun to outline plant science research areas for the next two decades. Action items will be developed to build for the future of plant science research, education, and training. Input will be requested from many different stakeholders to further the work of NPSI.●

CUR Dialogues 2018

"A Sense of Mission:

Pursuing Funding in Challenging Times"

Arlington, VA • February 15-17, 2018

Registration deadline: February 1, 2018

<https://bit.ly/2018CURDialogues>

Cooperative Agreements or Funding Student Research

Erin E. O'Brien (Dixie State University)

One of the biggest hurdles for new faculty trying to establish an undergraduate research program in their labs can be funding. A few of us are fortunate enough to leave graduate school or our postdocs with several years of funding secured from an existing grant and funding from a generous start-up package. For the rest of us, we often start with nothing. Not only no funding, but we often face a total lack of space dedicated to research. And yet, mentoring undergraduate research students has become a job requirement at most institutions.

Although you can certainly try your luck on the NSF, NIH, or NEH process with lower and lower chances of being funded with each passing year, there are alternatives. The alternative that has worked best for me is the cooperative agreement. Cooperative agreements are funds used to cover tasks at many federal agencies where federal employees have substantive involvement in the activity even though the funding is awarded to an academic or nonprofit partner.

Cooperative agreements often require a different approach and different expectations compared to a more traditional grant. Although I suspect that there are as many different paths to establishing sustainable funding through cooperative agreements as there are people involved in those agreements, I present a summary of what seems to work based on conversations and observations of about 30 or so university faculty who have varied experiences getting funding through these agreements. My experience is summarized in more detail.

My first cooperative agreement came about because I helped my university join the Colorado Plateau Cooperative Ecosystem Studies Unit. The process brought me into contact with the staff at a nearby National Monument who were willing to support the university's application. We built a working relationship well before money was even a consideration. They got to know me and my very general area of expertise. When they had a project they needed done that was somewhat related to what they thought I did, I got a phone call.

But the phone call wasn't to offer me money. Instead, they needed a brief description of the work I could do to meet the goals they had for the project and a detailed budget. This information went into a proposal they submitted for funding the project. I actually put together several of these before any money ever materialized. In the meantime, we continued to interact in a variety of settings. I brought my students to help them with an outreach program. I helped to advertise and refer students to their summer internships. And, quite honestly, I wondered several times if anything would come of any of the information I sent them.

They also passed along my name to other agencies that needed projects done—some of the organizations even had the money available within a few months of approaching me. By the time any money came from the original proposal, I had two other projects funded. None of the projects were things that I would have proposed if I was writing a grant, but they were all very doable. None of the funding levels were very much—they ranged from \$10,000 to \$18,000 per project, and most of those amounts were intended to fund work over

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more than one year. However, the money was always enough to buy basic equipment, to cover any significant transportation costs, and even to offer student researchers small stipends or hourly wages. That is all one really needs to get a research program started.

Since then, the agreements have grown in number and dollar amount, and I haven't worried about funding for research projects in several years. I've also worked to connect some of my colleagues to the various national parks in the region to help them start the process of building a relationship that could provide them with funding for their research. In doing so, I've noticed a very clear pattern of who is successful in ultimately obtaining funding through cooperative agreements.

Things to do:

- As you are first building a relationship, say yes. Ask for a few examples of work done by others and seriously consider if you can take it on and do it well.
- Do not approach these relationships from the perspective that your dearly beloved research project is what they should fund. As much as I adore the work I did in my first few years as a newly minted assistant professor, there wasn't funding for it. Instead, be open to helping federal agencies with what they need done—even if they tell you that they might be interested in your research.
- Ensure that you're honest about your expertise. When the

opportunity came up to evaluate a site for nearly every possible living organism that is easy to survey, I built a team of colleagues to assist.

- Be patient and continue to find ways to be useful to an agency even when there is no funding available. Not only does it strengthen your relationship with the agency, but even volunteering can provide your students with incredible experiences.
- Remember that substantive involvement of agency staff members means that you'll likely need to hold periodic meetings to discuss what you are doing, include them in the actual research, and be willing to modify what you are doing to help the project meet the constantly shifting priorities that your agency partners need to adopt with changes in administrations and changes in funding.
- Be up front about any publication requirements from your institution. If you need to publish a certain number of papers in journals of a certain caliber, you can generally find ways to include the collection of data that can be used for such publications, but those data may not be what the agency needs. I have found my agency partners to be open to tweaks and additions as long as they still get what they need and the entire project fits their budget.●

Student Travel Award Recipients (Fall 2017)

Bethany Bundrant

Mentor: Lance Barton

Austin College

“Investigating the Role of PA28gamma in
DNA Base Excision Repair”

American Society for Cell Biology

Annual Meeting

Saamera Awali

Mentor: Rachelle Belanger

University of Detroit Mercy

“Exposure to Environmentally-Relevant
Concentrations of Atrazine Causes DNA
Damage and Changes in Cytochrome P450
Expression in the Hepatopancreas of Crayfish
(*Orconectes virilis*)”

Society for Integrative and Comparative Biology

Alexa Gannon

Mentor: Rebecca Burgess

Stevenson University

“Characterizing the Interaction between Rad54
and PCNA”

American Society for Cell Biology

Annual Meeting

Kelsey Fittipaldi

Mentor: Richard Bastian

Monmouth University

“mTOR Upregulation in Neuro2a Cells Alters
Spontaneous Intracellular Calcium Signaling”

Society for Neuroscience Annual Meeting



Upcoming Deadlines

CUR Events

Visit the CUR Community

<http://community.cur.org/home>

and the CUR webpage

https://www.cur.org/conferences_and_events/

Conferences

2018 Massachusetts PKAL Network
Winter Meeting. Supporting All STEM
Students. January 10, 2018.

<https://www.aacu.org/pkal/regional/massachusetts/2018/winter-conference>

2018 PKAL Upstate New York Regional
Network Meeting. Strategies for Helping
Students Succeed: Group Share among
STEM Instructors for Majors and Non-
Majors Courses. February 3, 2018.

Registration deadline January 19, 2018

<https://www.aacu.org/pkal/regional/pkalyun/2018/winter>

2018 Southern California PKAL
Regional Network Annual Meeting. One
Size Doesn't Fit All: Using Varied
Instructional Approaches to Help All STEM
Students Succeed. March 10, 2018

Workshop proposal deadline January 5,
2018; poster abstracts deadline February 16,
2018

<https://www.aacu.org/pkal/regional/socal/2018/conference>

ASM Conference for Undergraduate
Educators: Prepare Students for the Next 25
Years: Workplace, Research, Society.
Austin, TX, July 26–29, 2018.

Registration opens February 1, 2018.

<https://www.asm.org/index.php/asmcuc>

Grants and Awards

NSF: Improving Undergraduate STEM Education: Education and Human Resources (IUSE: EHR), call opened October 1, 2017
https://nsf.gov/funding/pgm_summ.jsp?pi_ms_id=505082&org=NSF&sel_org=NSF&form=fund

NSF: International Research Experiences for Students (IRES; Track 1 can be for work with undergraduates), deadline January 30, 2018

https://nsf.gov/funding/pgm_summ.jsp?pims_id=12831&org=NSF&sel_org=NSF&form=fund

CUR Biology Division Student Travel Grants, deadline January 12, 2018
https://www.cur.org/governance/divisions/biology_student_travel_awards/

NIH Summer Internship Program in Biomedical Research (SIP), closes in April 2018
<https://www.training.nih.gov/programs/sip>
(website includes links to other summer undergraduate research programs)•

Coming up in SPUR...

Spring 2018:
“Undergraduate Research and Student Success Outcomes”

Summer 2018:
“Leveraging Undergraduate Research to Foster Diversity and Achieve Equity”

Fall 2018:
“Mentoring Models”

