CURQ Vignettes

Special Education Collaboration: Undergraduates Provide Voice and Perspective for Students and Families Living with Disabilities

Vaughn Bicehouse,
Edinboro University, vbicehouse@edinboro.edu

Our special education course on collaboration and development of individual education plans has been instrumental in affording our undergraduate students the opportunity to collaborate and build partnerships in the field, increasing their skills in qualitative research. Every student is required to engage in field research and spend time with a family that has a child with a disability. Each student chooses a case-study family based on a particular interest he or she has in the field. The students clarify their conceptual framework, decide on what qualitative design to use, develop research questions and conceptualize problems, and collect and organize their own data. Ultimately, the students put their findings in writing and share them with the family studied, faculty members, and their fellow classmates. Some of the students publish and present their findings at educational events and conferences. These collaborative experiences benefit everyone involved, as well as the university and the field of disability study at large.

The current statistics on disabilities, albeit important, do not convey the human impact of the disability. Therefore, the collaborative partnerships our students form with families dealing with disabilities provide a voice for the children and their families living twenty-four hours a day with a disability. This is what Featherstone (1989) terms "a people's scholarship"—a study in which "scientific facts gathered in the field give voice to a people's experience."

After spending time with each family and collecting data for their case studies, students analyze data, individually and then in groups, to identify significant statements, code data, and eventually discover emerging themes. They seek inter-rater reliability and report the results.

The study consisted of the families of seven females and 13 males, aged five to 53 years, whose primary disabilities included intellectual disabilities (ID), autism spectrum disorder (ASD), and attention deficit hyperactivity disorder (ADHD), as shown in Table 1. Three of the six individuals with ADHD had a secondary diagnosis of a specific learning disability (SLD), and one also had a mild intellectual disability. One individual qualified as having Asperger's Syndrome, and two others had a pervasive developmental disorder.

Table 1. Participants: Individuals with Disabilities

		Male	Female
		N=13	N=7
Primary Disability	Attention Deficit Hyperactivity Disorder	4	2
	Autism Spectrum Disorder	5	1
	Intellectual Disability	4	4
Age	0 – 5 years	0	1
	6 – 10 years	6	0
	11 – 15 years	2	1
	16-20	5	2
	21-25	0	2
	>26	0	1

Not only does engaging in action research provide valuable experience in collecting and analyzing data, but students gained invaluable insights that they can implement to better collaborate with the families and children they will serve during their teaching careers (Rogers 2007). Through interviews and discussions, students learned that families experience a wide range of emotions when their child is first diagnosed with a disability including, most commonly, sadness, fear, guilt, and hopelessness. For example, the mother of a child with ADHD, obsessive-compulsive disorder, and a mild intellectual disability said, "I felt as if I had done something wrong or let my daughter down when she was diagnosed at age eight." A mother of a nine-year-old boy with autism reported, "I feel fear every day; it's the not knowing. … You do not know what autism will dish out day to day." A mother of a six-year-old boy with autism lamented, "I think I was mourning the loss of the child I thought I would have. As any parent, I had dreams of the star athlete or scholar, and now I had to let go of those dreams." Finally, hopelessness came through in a quote from a mother of an eighteen-year-old with an intellectual disability who said, "I felt so alone, like no one was on my side. I wanted him to go to the same school as his siblings, but the district was very small, and they didn't think they could educate him. I became hopeless." Although far fewer, some families also expressed feelings of anger, frustration, and denial. Conversely, some parents also described more positive emotions, including relief, hope, and purpose. From the results, pre-service teachers developed greater empathy for families and ascertained practices that they would need to employ to better meet the needs of the families and students.

While many of the families in the study reported positive experiences with schools, teachers, and service providers, our students also learned best practices from parental reports of negative experiences. The results of this study demonstrated overwhelmingly that families value communication, understanding, support systems, and non-academic experiences as part of the collaboration between families and schools.

Each student's case study highlighted the strengths, needs, challenges, hopes, and the fears of each family. Their findings were authentic, multifaceted, intimate, and holistic. As Donlevy (2001, 8) has said, "In special education, the most significant variables have little to do with curriculum details and mandated exams; they have everything to do with the lived experience of important human relationships." This means building a relationship of trust between the student, the parent, and the teacher for every child. Special education is a dynamic and diverse field, and professionals, teachers, students, and parents are desperately seeking best practices to meet the needs of those with disabilities. We hope the collaborative efforts of our education students are helping to fill voids in the research, discourse, and practices that in due course will benefit children with disabilities and their families.

References

Donlevy, Jim 2001. "High-stakes Environments and Effective Student-teacher Relationships: Some Lessons from special Education." *International Journal of Instructional Media* 28 (1): 1-8.

Featherstone, J. 1989. "To Make the Wounded Whole." *Harvard Educational Review* 59: 367-378.

Lawrence-Lightfoot, Sarah and Jessica Hoffman Davis. 1997. *The Art and Science of Portraiture*. San Francisco, CA: Jossey-Bass.

Rogers, Chrissie. 2007. "Disabling a Family? Emotional Dilemmas Experienced in Becoming a Parent of a Child with Learning Disabilities." *British Journal of Special Education* 34 (3): 136-143. doi: 10.1111/j.1467-8578.2007.00469x.

doi: 10.18833/curq/36/4/18

A Distributed REU Site Focused on Serving Physics and Astronomy Students from Comprehensive and Community Colleges

Michael Jackson,
Millersville University and Central Washington University, mjackson@millersville.edu

John F. Mateja,
Goldwater Scholarship and Excellence in Education Foundation, goldwaterpres@vacoxmail.com

This project sought to provide students with their first faculty-mentored research experience. The principal difference between this National Science Foundation (NSF) Research Experiences for Undergraduates (REU) initiative and the more traditional, single-campus physics and astronomy REU is that our program used a distributed model with students conducting their research at different institutions across the nation. Seven universities participated in hosting REU students during the program, including Central Washington University (CWU), College of Charleston, Embry Riddle Aeronautical University, SUNY-Geneseo, University of Wisconsin-La Crosse, Weber State University, and Wright State University.

The CUR Physics and Astronomy (CURPA) Division's distributed REU had some features that resemble those found in a traditional, single-institution REU and others that are not.

1. As with a traditional REU, the CURPA program featured faculty mentors who were seasoned researchers. Most had significant experience mentoring undergraduates, including students in their early years of college. Faculty members without prior mentoring experience were coached by experienced faculty.
2. CURPA REU undergraduates joined two learning communities: other students in the CURPA REU cohort and students at each host site supported by other programs. Thus all CURPA students had on-campus peers with whom they could work and interact. CURPA REU students "networked" with one another electronically throughout the summer, in much the same way that today's large-scale research groups communicate (e.g., webinars and email). All CURPA students participated in an end-of-summer, face-to-face multiday networking experience at the principal investigator's campus, Central Washington University, an activity identified by other programs as necessary and important (Hubenthal and Judge 2013).
3. Participants received feedback from their immediate supervisor and from the broad array of faculty and students participating in the project. This exposed partic-

ipants to individuals with a diverse range of physics and astronomy sub-disciplinary knowledge and skills.

4. Colleges report that about one-third to one-half of undergraduates change their majors at least once (Foraker 2012). Through webinars, informal discussions with faculty mentors and peers, the CURPA REU program provided formative experiences, generally early in participants' academic careers, that will assist them in making better-informed decisions earlier in their undergraduate years.
5. CURPA REU students, who generally came from smaller schools, had the opportunity to pursue a research experience at an institution with a relatively similar academic and "community" environment.
6. By using CURPA councilors and faculty members, students had access to a diverse range of disciplinary expertise and research topics. Additional mentors could also be readily recruited to accommodate a greater number of participants.
7. The project benefitted from collaboration with the CUR National Office for assistance with recruiting through the NSF-funded Community College Undergraduate Research Initiative (CCURI) (Hensel and Ambos 2011; Hewlett et al. 2011).

NSF's Division of Physics funded the CURPA REU as a two-year pilot for six students in each summer. Additional support from the Washington Space Grant Consortium and CURPA enabled the project to support an additional student each summer. The program's two-year student demographics included six males and eight females with students identifying themselves as Hispanic (2), African-American (1), Asian (2), and Caucasian (9). Two students identified themselves as veterans. Of the 14 participants, eight were first-generation college students. Two of the program's undergraduates were rising seniors, eleven were rising juniors, and one was a rising sophomore. Four students were from community colleges, five students were from comprehensive institutions, and five students were from research institutions.

The format used by our REU each summer was:

Week 1: Participants traveled to their respective host institutions and were introduced to the campus, work place, and that university's cohort of summer research students. Participants completed training in safety and in responsible conduct of research and developed a work plan with their research mentor*. This work plan facilitated the discussion of expectations between the student and mentor, outlined what research was to be accomplished, established a deliverables timeline, and enabled mentors to provide a context for how the student's work fit into the bigger scientific picture.

Weeks 1 – 9: Students conducted their research. To promote communication among the REU cohort and engage members as a learning community, participants interacted through weekly webinars, with additional interactions available through other mechanisms (e.g., Canvas, the course-management program used for the program). Several students wrote weekly research blogs using WorldPress' *Undergraduate Research Reports*.

During weekly webinars, students interacted with practicing physicists and astronomers, discussed their research projects, and participated in a number of targeted activities such as the American Institute of Physics' Careers Toolbox (AIP Career Pathways Project 2015).

Week 10: Students and PIs traveled to an end-of-summer meeting at Central Washington University to finalize the students' deliverables (i.e., presentations, written reports, assessment of the program). This five-day event also provided participants with a bonding experience that included activities and field trips (e.g., a visit to the Laser Interferometer Gravitational Wave Interferometer in Richland, Washington).

Research Projects and Products

Research projects were designed and developed by mentors to advance students' fundamental knowledge within the discipline and to provide them with an opportunity to engage in research and make meaningful contributions to the investigation. The research performed by REU participants was either experimental or computational and represented a diverse array of physics and astronomy subfields (e.g., Properties of CU doped ZnO thin films grown by spray pyrolysis, A search for pulsations in the sdB star EC20117-4014, etc). These projects also introduced students to the scientific literature, ethical conduct of research, and procedures for oral and written scientific presentations.

During the first year of the project, the students' work resulted in one peer-reviewed manuscript published in a professional journal (Jackson et al. 2015), with a second manuscript in preparation. Three presentations were made by the REU students at NCUR, with two additional presentations made at local/regional meetings. Two students received local awards for their research. Four of the students participated in a second research experience the following summer.

To address NSF reviewers' concern that the CURPA model

might lead participants to feel isolated, the PIs and faculty at the host institutions implemented several measures:

1. A mechanism was put in place that enabled the REU participants to regularly communicate with one another through Canvas.
2. Ice-breaker and collaborative/competitive activities were conducted throughout the summer at the host sites.
3. As noted, a final face-to-face meeting was hosted at CWU, and field trips were funded using non-NSF funds from CURPA and CWU.
4. The PIs communicated at least weekly with the REU students, providing program updates and feedback.

Evidence that these measures were effective in addressing isolation can be found in the students' exit surveys. Asked what elements of the REU had the greatest impact or benefit, the fourteen participants of the program listed:

- "Social interactions with Mentor at the Host Institution" (mentioned 12 times),
- "Social interactions with Students at the Host Institution" (9 times), and
- "End-of-the-summer activity at Central Washington University" (9 times).

One student described her interactions with the REU faculty and students as the "best part of the research experience."

Seven of the fourteen participants entered the summer research interested in obtaining a PhD. By the end of the summer, 11 of the 14 students (79 percent) indicated such an interest. Although the desire to pursue a doctoral degree is neither the focus of our program nor necessarily an indicator of its success, it is indicative of students' increased confidence in their ability to perform research. It also suggests that a distributed REU is as effective in building students' confidence in their ability to do graduate-level work as is the more traditional single-campus REU.

Funded by National Science Foundation Award #1358879

References

AIP Career Pathways Project. 2015. "Careers Toolbox for Undergraduate Physics Students." American Institute of Physics and the Society of Physics Students, <http://www.spsnational.org/careerstoolbox/>.

Foraker, Matthew. 2012. "Does Changing Majors Really Affect the Time to Graduate? The Impact of Changing Majors on Student Retention, Graduation, and Time to Graduate." *White Paper*, Office of Institutional Research, Western Kentucky University.

Hensel, Nancy, and Elizabeth Ambos. 2011. "Collaborative Research: Community College Undergraduate Research Initiative (CCURI)." NSF award 1118680.

Hewlett, James, James Jacob, Virginia Balke, John VanNiel, and Jacqueline Crisman. 2011. "Collaborative Research: Community College Undergraduate Research Initiative (CCURI)." NSF award 1118679.

Hubenthal, Michael, and Jasmeet Judge. 2013. "Taking Research Experiences for Undergraduates Online." *EOS, Transactions, American Geophysical Union* 94 (17): 157-174. doi: 10.1002/2013eo170001.

Jackson, Michael, Michael Smith, Clarissa Gerke, and Jose M. Barajas. 2015. "Measurement of Far-infrared Laser Frequencies from Methanol Isotopologues." *IEEE Journal of Quantum Electronics* 51 (4): 1-5. doi: 10.1109/JQE.2015.2398352.

*A listing of Fermilab's summer research programs, along with information for both mentors and participants, can be found at http://ed.fnal.gov/interns/programs/ (retrieved August 3, 2015).

doi: 10.18833/curq/36/4/19

Research Collaboration Creates Opportunities for High-Impact Undergraduate Research

Ann E. Ellis,
Grinnell College, ellisa@grinnell.edu

Lisa M. Oakes,
University of California, Davis, lmoakes @ucdavis.edu

It is well known that authentic undergraduate research contributes to positive student growth by developing students' disciplinary knowledge, general critical-thinking skills, and broader career plans. In our disciplinary field, psychology, providing such high-impact experiences can be a challenge, particularly at smaller institutions with potentially limited access to resources such as appropriate study populations and technological expertise. Over 15 years, however, we have maintained an active collaboration—author Oakes at the University of California Davis and author Ellis at Grinnell College—investigating early development of cognition in infants and toddlers. We collaboratively—and often with our students—develop research questions, design experimental procedures, and create study materials. We collect and analyze data at both institutions, typically combining our efforts in presentations at conferences and published manuscripts.

This work is labor intensive and involves conducting in-lab assessments of infants' and toddlers' abilities. Students at both of our institutions, Grinnell College, a small liberal arts institution, and the University of California, Davis, a research university, have been directly involved in this cutting-edge research. Students at both institutions receive mentoring from both of us, sometimes in person (e.g., when Dr. Ellis and Grinnell students visit UC Davis) and sometimes via teleconference and e-mail. We leveraged programs at both institutions to create contexts in which undergraduate students participated fully in the research process from inception to completion, in order to create high-impact research experiences.

One example of a program we have utilized is the Mentored Advanced Project (MAP) program at Grinnell College. MAP provides the opportunity for Grinnell students to receive mentoring from both of us while engaging in a research project at one or both institutions. Over the years, this MAP experience has ranged from Grinnell students physically remaining on campus for the entirety of the experience while receiving joint mentoring locally and remotely, to Grinnell students participating fully in both labs by spending days or weeks in each laboratory, to Grinnell students spending the majority of their research time at UC Davis, while receiving joint mentoring from both of us during on-site visits by Dr. Ellis and remotely when we are in different locations.

In each iteration, students became immersed in the research process while interacting with both of us and with staff and students at UC Davis. Although we have not engaged UC Davis students in a similar formal program, the undergraduates in the UC Davis lab gain from these experiences through collaboration with Grinnell students and through working remotely and during on-site visits with Dr. Ellis.

In the summer of 2015, we mentored a Grinnell student at a distance. The student spent the summer at UC Davis, receiving local mentoring and supervision and also remote supervision from Grinnell (e.g., weekly go-to-meeting conference calls, daily on-line journals). As with all MAP students, while conducting her project under our joint mentorship this student gained a broad base of discipline-specific knowledge and skills. The student proposed and designed a project, used the resources at UC Davis to create study materials, acquired programming skills, and engaged in data acquisition. Importantly, because the UC Davis lab is a cooperative environment, the student worked closely with other undergraduates working in the lab. With local guidance from both of us during Dr. Ellis's on-site visit, the student processed and analyzed her data. Throughout the process, the student developed independence and self-confidence. She presented her findings at an event at Grinnell College and at the national meeting of the Cognitive Development Society.

This example illustrates the approach we have taken with all of our MAP students. Regardless of where students ultimately conducted the work, students worked within the parameters of our collaborative research program to interpret the primary literature, design experimental protocols, and write research proposals for projects that could be completed in our labs. Our laboratories at the two institutions are configured with identical equipment so that student research projects are transportable between the two institutions, and so that data collection can occur at both locations simultaneously, if necessary. Because our work involves teams of student researchers, our MAP students became fully immersed in laboratory research activities, contributing to the day-to-day activities in the labs. The Grinnell students gained valuable experience in the larger Davis lab, which has undergraduates, graduate students, postdoctoral scholars, and professional research staff. They acquired critical technical, data, and management skills, and developed a broad understanding of the diversity of individuals who contribute to the research process.

Because multiple studies are conducted concurrently in each location, and because the UC Davis lab is engaged in several grant-funded projects, students in the program became knowledgeable about the work of others. At the UC Davis lab, in particular, students helped conduct experiments on a range of infant cognitive abilities. They attended lab meetings and participated in the greater research community at the Center for the Mind and Brain. These experiences served to build students' intellectual curiosity, heighten their ethical sensibilities, develop their understanding of the depth and breadth of the field, and forge their understanding of the tight connections between research and application.

Moreover, when MAP students and the Grinnell faculty mentor were actively engaged in both locations, these experiences were particularly rich not only for the Grinnell students, but also for the UC Davis students and staff who interacted with them. Grinnell's open curriculum requires students' active engagement in the creation of their own individualized educational paths, and the MAP program selects students who are self-motivated and who have a strong desire for independence and self-sufficiency in their research program. UC Davis students, in part as a function of their experience at a much larger institution, may not have experienced the same level of educational autonomy expected of Grinnell students. Hosting Grinnell MAP students in the lab, therefore, provided an excellent model for the local UC Davis students. In

addition, UC Davis students gained exposure to a scholar (Dr. Ellis) who works in a different educational context than they experience at Davis, thus enhancing their understanding of the range of potential career paths in the field. All students learned to work collaboratively and cooperatively to conduct the research, to develop technical and quantitative skills, and to advance psychological research.

There are several challenges to developing a program like ours. The first is to identify an appropriate research context. We have been effective because we have a long-standing ongoing collaboration. Thus, although student projects were self-contained, they fit into a broader research context. This has allowed us to combine student work with other work for the purposes of publication, and it has allowed us to fully engage in the research at both institutions. The second challenge is to identify appropriate student projects. Although our collaboration provided a context for student projects, it can also inhibit students' exploration of diverse topics. Because our work is often tied to federal funding, student projects must address the aims outlined in those grant-funded projects. This can provide students insight into how research is supported, and about the constraints placed on the research process by external funding. However, because of these constraints, we have worked with students to come up with creative solutions for them to be able to insert their own ideas into a project that fits within the scope of our ongoing work. Finally, our success depends on having laboratories that are identically equipped. Even slight changes in equipment or software would mean that data from our two labs could not be combined. We constantly are vigilant to maintain laboratory equivalence.

In summary, our collaboration has created high-impact learning environments that develop undergraduates' intellectual curiosity, ethical sensitivity, independence, and self-confidence in the context of conducting authentic research. All Grinnell College students who have participated in our collaborative research currently are enrolled at Grinnell, are in formal research or fellowship positions, or are pursuing or have earned advanced degrees. Experiences in our laboratories set our students on a course for more challenging work and have served to positively shape their career trajectories.

doi: 10.18833/curq/36/4/20

Spreading High-Impact Practices from the Genomics Lab to the Entire College and Beyond

Gita Bangera, Cheryl Vermilyea,
Bellevue College, gbangera@bellevuecollege.edu

Kim Harrington,
Tacoma Community College

In the 21st century, community colleges are emerging as the backbone of higher education in the United States. Nearly half of all undergraduates start their education at community colleges and the percentage is even higher for students from groups underrepresented in higher education. National Science Foundation (NSF) grants are valuable for developing high-impact practices by individual faculty at various institutions, including collaborations between community colleges and research institutions. However, these practices will not change the higher education landscape unless they are scaled up to spread across the institution and across multiple institutions. Here we describe our ongoing endeavor to expand a model from two NSF-funded programs and to identify critical components and strategies in this process.

The Community College Genomics Research Initiative (ComGen), an NSF-funded program, started as a collaboration between Bellevue College and the Root Disease and Biological Control Research Unit of the United States Department of Agriculture's Agriculture Research Service. The USDA scientists provided a small fragment DNA library, technical advice, and classroom visits. Students at Bellevue College (from first-year to those with PhDs) enrolled in a stand-alone research course modeled as a one-quarter, graduate school experience. Without lectures or textbooks, students got a first-hand experience in being a scientist, including conducting original research in genomics and analyzing primary literature. The ComGen model focuses on a "hands-on, hands-off" method: hands-on for students and hands-off for the faculty. This method encourages faculty to empower students to experience the ambiguity, failure, and recovery from failure that are inherent in research. The ComGen program has drawn national attention, being featured in *Science* (McCook 2011) and drawing an invitation from the White House to engage in a pledge to increase the number of students in science, technology, engineering, and math (STEM) fields.

While the stand-alone research course had substantial impact, the number of students reached was limited since the course was an elective that many students could not fit into their schedules or afford. To expand the impact of the ComGen pedagogy, we introduced critical components of the original course into the cell biology course for biology

majors at Bellevue College and Tacoma Community College (Tacoma CC). This strategy allowed significantly expanded numbers of students to participate in undergraduate research early in their studies. Our second NSF grant is currently taking this experience to students across the state of Washington. Bringing undergraduate research into the regular curriculum in this fashion has the potential to impact the diversity of the research establishment (Bangera and Brownell 2014).

To expand incorporation of research practices into curricula within our institutions, we have followed two different paths based on institutional culture. At Bellevue College, we have leveraged the success of ComGen into the founding of a new division called the RISE (Research, Innovation, Service and Experiential) Learning Institute, directed by a new dean of undergraduate research. The RISE Learning Institute will take innovative research and elements of the experiential-learning curriculum to departments across campus, not just those in STEM fields. The success of the original ComGen collaboration is helping to introduce these high-impact practices more broadly at Bellevue College.

At Tacoma CC, transforming the culture started with the incorporation of ComGen elements into the curriculum of the biology major, followed by incorporation of these elements into multiple other courses developed by the faculty. The success of these courses was leveraged by faculty into a request for funding to reenergize the science and engineering department and to integrate research and technology into courses, to increase mentoring in engineering, and to institute a divisional retreat to discuss best practices.

Both Bellevue College and Tacoma CC have benefited from the vision of their leadership, including their presidents and boards of trustees. Bellevue funded the purchase of a $60,000 DNA sequencer and provided dedicated research space for ComGen activities. This commitment has now expanded through the development of the RISE Learning Institute, including funds for the salary of the dean of undergraduate research and a $5-million remodeling of space to build a trans-disciplinary undergraduate research lab. Additional support has come through development of a "collaboratory" to showcase the process of research to all students and partial funding of a research lab technician. The Tacoma CC administration has approved reduced class sizes for research courses, provided release time for faculty to focus on incorporating research into the curriculum, and funded equipment and consumables. The college is now exploring the possibility of incorporating funding for research in both STEM and non-STEM areas into the operations of the college.

With our second NSF grant, we were able to train faculty from 18 different institutions (15 community colleges and three universities) in using research as a pedagogical tool. This rapid extension to almost half the community colleges in Washington state has been possible because the ComGen team has developed an easy-to-adopt model that allows faculty to embed this pedagogy into their existing curricula. To extend engagement to other colleges, the ComGen team has developed a comprehensive strategy that includes outreach to faculty, technicians, administrators, and staff. In addition to interested faculty, technicians are also invited to an annual summer workshop that covers the critical elements of the ComGen philosophy. To encourage interest and investment by other stakeholders, the team made presentations at venues such as the annual meetings of the vice presidents of instruction and of the non-academic staff of all 32 community colleges in the state.

Our experiences indicate that taking research to students in the context of their regular coursework is important, as is making adoption of the research pedagogy easy for faculty. Thus, building research into the normal functioning of the college is essential to bringing a culture of research to a community college. Until research becomes as much part of the culture at all community colleges as it is at Bellevue College or Tacoma CC, funding from NSF and other sources to develop and support communities of practice is critical.

References

Bangera, Gita, and Sara E. Brownell. 2014. "Course-Based Undergraduate Research Experiences Can Make Scientific Research More Inclusive." *CBE-Life Sciences Education* 13 (4): 602-606. doi: 10.1187/cbe.14-06-0099.

McCook Allison. 2011. "Two-Year Colleges Are Jumping Into the U.S. Research Pool." *Science* 333 (6049): 1572-73. doi: 10.1126/science.333.6049.1572.

doi: 10.18833/curq/36/4/21