When asked to participate in this workshop I accepted without hesitation, but more out of respect for the mission of the RCREC and the vision of Brian Schrag than out of any confidence that I had something to offer. Indeed, I wondered if I actually had much to offer from the viewpoint of Junior Faculty, particularly since I was not involved in any sort of Responsible Conduct of Research (RCR) efforts in my new position. Then it struck me—this was the first time since graduate school that I was not involved, formally or informally, in RCR, other than what was involved in running my own lab. This was not for lack of trying. My offers to become involved with various RCR efforts or to act in various capacities that required RCR-trained faculty were all “appreciatively unaccepted” by senior colleagues and supervisors. They were acting in what they felt was my best-interest, though I was unclear as to the rationale. It turned out to have everything to do with “credit”.

It took time for me as new Faculty to gain some appreciable level of understanding of the degree of “accounting for effort” that accompanies a Faculty position, and I fear there is still more to discover. This accounting appeared to outstrip even that required for one of my hourly-wage summer jobs assembling office cubicles—a job which had the distinct advantage of being able to leave one’s work at the office. Though it is an endless frustration for nearly all involved, and an easy target for jokes, this accounting endeavor does have a legitimate and necessary purpose—to determine to what end effort has been expended, and to whom credit must be provided. If it took time for me to come to some appreciation of the accounting for effort, it took more to appreciate the system of academic credit, which was surprisingly distinct from scientific credit (authorship, etc.). It also took time to appreciate how credit reflected the degree of support for the various missions at play, and how those missions interact and influence each other. It is this dynamic
interaction between effort, credit, and mission, with the focus on credit, which became the topic of my “Junior Faculty Perspective” on the Challenge of Research Ethics Education in the University Setting. My panel presentation followed from the premise of the submitted essay (“The ‘pickle’ of credit”, which is presented below) but departed from its content in order to present a more personal side of the premise. For this published context, the departures that were part of the platform presentation are distinguished from the essay proper.

**The “pickle” of credit**: A mission/mandate whose fulfillment is in the best interest of all involved may still not be adequately pursued if the efforts required to fulfill the mission are not given the necessary credit.

**Corollary for Junior Faculty**

Often it is the youngest faculty members who have the best ability to help compliance bodies deal with the newest technologies and research conditions, but they may also be the least encouraged to do so if the efforts are not directed toward the mission of the home Unit and/or may not be credited toward their promotion/tenure portfolio.

The premise begins with the University-level research oversight and Ethics Education required by the “resource-providing entities” (most often NIH and NSF). These programs are mandated by Resource-Providers and are put in place by the University. Often, needs that must be fulfilled in order to advance the Missions of the University (in this case Research), but that do not fit into the standard model of Unit and/or Individual efforts, are answered by creating non-standard Specialized Units. Many of these specialized Units can be highly effective, but they can also suffer for un/under-resourced and/or improperly-resourced mandates. The resources are both monetary and expertise. For example, a Specialized Unit tasked with a Mission that can only be fulfilled by active participation by Faculty belonging to Standard Units (e.g., Departments) but which does not receive the necessary participation will fail in its mission. The Faculty could be at least partially responsible for such a failure, but so could the Standard Unit and/or the University if those entities have policies that prevent the Faculty from participating. It is common and rational for University compliance and oversight bodies to rely on the expertise at hand. Whether or not they receive adequate participation depends on numerous factors, but most of these factors involve the policies of the University and Standard Units.
The schematic figure indicates some of the forces at play in this premise. Universities receive mandates from Resource-Providers to institute thorough and effective Responsible Conduct of Research and Research Ethics Education (RCR / REE) and oversight programs. This mandate is often fulfilled through efforts of a Specialized Unit (not in figure). In many cases the Specialized Unit relies on efforts of Individual experts (Faculty housed in Standard Units). However, the Standard Unit (and University) and the Resource-Provider exert additional forces on the Individual that may or may not be consistent with the various missions of the Individual, particularly with respect to efforts like those of the Specialized Units. Good situations exist where all University parties are on the same Mission. Bad situations exist where there are non-aligned or conflicting missions. The best outcomes will arise by enabling and encouraging the Standard Unit to facilitate RCR/REE efforts, not simply provide begrudging approval or, worse yet, discourage/prevent such efforts by qualified and interested faculty. At the same time it should be recognized that the Standard Unit is put in the middle of pushes from either direction.

We will take as given that RCR/REE is necessary and of benefit to all. With this in place we can then address the responsibilities (focused on the topic at hand) of the parties involved in carrying out the objective of providing adequate RCR/REE.

- **Resource-Providers**: Must ensure a judicious distribution of resources, and thus have established the need for Ethics Education and oversight, and have determined that local implementation (i.e, at the University) is preferable to central.
- **University**: Must respond adequately to the mandate or risk losing resources, accreditation, and jeopardizing the publishability of research performed at the University. They have thus created Specialized Units charged with Research compliance oversight and delivery of Ethics Education, both with metrics that can be reported to Resource-Providers.
• **Specialized Unit**: To carry-out the mission of Research oversight/compliance and to deliver the necessary training and education.

• **Standard Unit**: To carry-out Teaching, Research, and Service Missions as set forth by the University.

• **Individual**: To conduct research in an ethical manner, recognize the need to train and educate students/staff/trainees to do so as well, and to participate in the formal and informal delivery of this type of training and education where and whenever possible.

It is clear that the entity principally responsible is the Specialized Unit. However, fulfillment of that mission requires the active participation of the individuals directing and performing the research, which is not something that can be taken for granted. The efforts of the Individuals are controlled to a greater or lesser degree by the Standard Unit which does not have a direct charge to engage in RCR/REE. The responsibility of the Standard Unit is at best indirect, even though it is directly in their interest. This disconnect is at the core of the “pickle”.

**HOW TO ALLEVIATE THE “PICKLE”**?

It seems paramount to identify or create ways for Individual Faculty member efforts toward research ethics education to generate credit for the Faculty member and both the Specialized and Standard Unit. The specifics of these policies will of course vary, but there are some likely commonalities. The Specialized Units, acting on behalf of the University community as a whole, can play a major facilitating role in alleviating the “pickle” by making the efforts of the faculty member “creditable” toward Service and/or Teaching. There is an issue with Teaching, however, in that if teaching efforts are not aimed at the teaching responsibilities of the Standard Unit, then Chairs are unlikely to allow these efforts. It is again the Specialized Units that can alleviate the issue by providing some form of compensation to the Standard Unit whose Faculty members are involved. The Specialized Unit is likely to need backing from the University, but given the overall benefit to the broader University community, this type of approach seems justifiable.

**SPECIAL CONSIDERATIONS REGARDING JUNIOR FACULTY**

Almost irrespective of the University, junior Faculty members have unique pressures and requirements which are centered principally on
achieving the requirements for receiving tenure. Associated with these forces are those exerted on the Junior members to contribute to the mission of the home Standard Unit. Although these forces can vary widely in direction and degree across Standard Units, they have commonality in that they will tend to focus the efforts of all Faculty onto those activities that further the Mission of the Unit. How well that coincides with the Mission of the Individual can, unfortunately, vary widely.

While the tenure-related pressures are perhaps unique, Junior Faculty members do not exist in a vacuum in this situation. There is most certainly a major role to be played by Senior Faculty in delivering RCR/REE. In many instances, it is likely they who carry out the current version of the Research Ethics programs mandated by Resource Providers. Further, they have many advantages in terms of providing these programs. To start, there is no concern for tenure with this group. Further, in many cases, and often related to the tenure issue, they often have less time committed to writing grants, either because they have, or they are not seeking, research funding. Additionally, the Education programs are best provided by those with significant research experience, preferably also by those with experience in dealing with the Resource Providers. This latter point is very important, and actually argues against a role for Junior Faculty in the RCR/REE programs.

We then come to the question: Should Junior Faculty be included in Research Ethics Education? If the answer is no, then the “pickle” can still exist, but would be limited to the Senior Faculty. If the answer is yes, then the potential for the “pickle” would apply across the board.

New Junior Faculty members often arrive with unique knowledge and skills that can be an important resource for University entities charged with research oversight/compliance and Research Ethics Education. They may also be the reason that such bodies need additional resources, perhaps because they carry out research in areas new to a given University, or bring technologies that the University had previously been lacking. Many technologies that are well-established today certainly carried difficulties for users, oversight bodies, and ethicists alike when they were first being implemented. Consider how recombinant DNA technologies, viral vectors, stem cells, and transgenic mice impacted these entities and the research endeavor.

Example: When I established a new lab I took the opportunity to start using a new technology that I had been following in literature, at meetings, and in consultation with some of the
originators. When I submitted protocols to the appropriate oversight committees at my Institution, I received messages such as “What is optogenetics?” A perfectly fair question—nobody at the institution had used those methods to that point and the technology had been developed less than 6 years prior, with fewer than 15 papers published on the topic in the year before I submitted my protocols. However, the year I submitted there were nearly 30 papers, the year after that there were more than 60, and the year after that NIH offered supplemental grants specifically to facilitate investigators buying equipment to start using optogenetic techniques. Perhaps most importantly, grant reviewers started asking “Why aren’t you doing this with optogenetics?”.

Research and education using these technologies can proceed only if the oversight bodies and the University community become properly informed. While many other resources may (or may not) exist, the Faculty members themselves are an excellent resource. The impact of these experts can be enhanced if they are engaged in the process beyond simply seeking/gaining the approvals necessary for them to conduct the research that will be paramount to determining their future at the University. This argues for their inclusion in the RCR/REE process.

I will depart briefly from the discussion of credit and RCR/REE proper to provide an example of the role that “younger generations” can play in RCR as the research endeavor evolves, and the value of cultural evolution in academic research.

NIH (NOT-OD-10-019) Update on the Requirement for Instruction in the Responsible Conduct of Research: “…it is well appreciated by all that responsible conduct, as opposed to misconduct, encompasses many other aspects of ethical behavior in the practice of scientific research.”

“The practice of biomedical research continues to evolve in terms of the interaction of participants (team research) and participating disciplines, emerging technologies in both the laboratory and in the publishing arena, and in the interactions of academic, medical, and for-profit enterprises.”

Like anything, science has culture, and different disciplines have different cultures. As with any culture, there is tradition and evolution, and occasionally revolution. Tradition helps to maintain best-practices in all generations of participants, and helps establish them for those
generations that are in the process of learning the rationale for those best-practices. Culture must evolve with advancing practice, however, or risk self-induced obsolescence or revolution. Even scientific culture which has the (theoretical) advantage of being practiced by those steeped in traditions of constructive criticism and constant self-examination can fail to advance or advance too slowly to remain relevant (and compliant), often by omission not commission.

For example, there was a highly-respected senior scientist who spent most of his very distinguished career performing primarily single-lab research—i.e., using primarily one or two techniques resident in the lab. In the senior researcher’s first 40 years of publishing, there were rarely more than 3 authors and a single institution credited. In the latter 10 years, during this PI’s participation in a new form of highly-interactive research, the number of authors on many papers doubled or tripled, with a concomitant increase in the number of institutions. The PI one day went to speak to a post-doctoral associate in the lab who was busily preparing a set of CDs. The PI asked what they were doing. The post-doc replied that since they were responsible for most of the work included in a recently-accepted paper, they were preparing appropriate materials to be sent to all of the co-authors. This included spreadsheets, a variety of figures not included in the publication, and presentation files. The PI commented that they had never had to do this before and it had not occurred to them, but that it was quite a good idea and good practice.

A new manner of conducting and reporting research, even without a change in policies or mandates, engenders new ways of conducting research responsibly. Junior faculty members were trained in the new environment. For the life sciences that environment currently stresses interdisciplinary collaboration and is comfortable with, and even encouraging of, partnership with industry, far more than in the past. These faculty members bring valuable practices and insights for advancing the RCR/REE at their institution.

**CONCLUSION**

University-based research and education programs will be best served if the Research Ethics Education and Responsible Conduct of Research programs are properly resourced and facilitated. Both Senior and Junior faculty members have significant expertise and insight to offer and should both be engaged in developing and delivering these programs in formal settings and in their laboratories. The Specialized Units should
recognize the disconnect between their mission and that of the Standard Unit, which directs the efforts of the Individuals. The Specialized Units should provide an adequate framework for the Standard Units to facilitate the efforts of Individuals toward the Mission of the Specialized Unit, which is of benefit to the entire University.