Karen Muskavitch's Commentary on "Whose Lab Is It?"

Commentary On
Whose Lab Is It?

This case raises two very important questions with regard to research conducted in the collaborative setting of an academic laboratory: "Whose lab is it?" and the corollary "Whose research is it?" These questions are most pertinent when they concern research conducted by a post-doctoral fellow or a graduate student, as is the situation here. In the biology laboratories with which I am most familiar, the research of a graduate student like Archibald is typically the basis of his dissertation and in that sense is "his," but the work is part of a larger project on which the entire laboratory is working, and will continue working after he completes his degree and moves on. In this sense, the research is not his but rather belongs to the lab and the director of the lab. Most people are now aware that the research notebooks belong to the lab, and in many cases the convention is that the research questions stay in the original lab as well.

Many people are typically involved in a research project in an academic laboratory including the faculty member who is the principal investigator (PI) on most of the grants supporting the laboratory, a few post-docs trying to get their CVs in shape for the job market, some graduate students working toward their degrees, perhaps some undergraduates, and a few technicians. The technicians may range from those with advanced training in the field, even doctorates, to those who came to the lab with no special training and may only be able to carry out relatively routine tasks. Linking all these people is a complex web of relationships that can sometimes become strained or frayed.

This scenario focuses on one of these relationships, that between a graduate student and the faculty member who directs the laboratory. You will note that I have avoided using the term "mentor" to describe the faculty member. Contrary to what is usually assumed in the sciences, a graduate student's research adviser might not be the student's mentor. As noted in *Adviser, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering*, a recent book

from the National Academy Press,

> A fundamental difference between a mentor and an adviser is that mentoring is more than advising; mentoring is a personal as well as a professional relationship. An adviser might or might not be a mentor, depending on the quality of the relationship. . . Everyone benefits from having multiple mentors of diverse talents, ages, and personalities." (National Academy of Sciences et al., 1997, p. 15)

Because we do not know what the quality of the relationship between Archibald and Baker has been, I will simply use the term "research adviser" to describe Baker's relationship to Archibald.

Serving as a research adviser to a graduate student includes a number of responsibilities. (I will discuss the student's responsibilities in the commentary on Discussion Question 6.) These include guiding the student's research project by communicating effectively with the student, reviewing and providing regular feedback on the student's progress, and helping the student to acquire and develop the skills needed by independent researchers in their scientific field. In this case, we see that Archibald is meeting with Baker on a regular basis and that she reviews his work over the past week, looks at the primary data (not just the summaries that Archibald presents to her), and gives him concrete ideas on what to try next. This pattern of behavior is very good, and it seems to fulfill the first of the responsibilities of advisers. However, the way in which the conflict between Archibald and Baker is presented in this case leads one to wonder how well Baker has communicated the overall goal of the laboratory's research to her lab, and to Archibald in particular. He seems to be focused on the short-term goal of purifying cambin as quickly as possible and by whatever means so that he can do his experiments, write his dissertation and finish his degree. Baker, on the other hand, seems to be focused on the long term, on working with proteins purified in a unique way without the use of detergents. It is not clear whether Archibald just doesn't care about the long-term goals of the lab, or whether Baker has failed to communicate them to her collaborators. If the latter, then she has also failed to help Archibald to develop one of the skills he will need in a future career in science: the ability to see the big picture as well as determine the details of the next protocol that should be tested. In fact, her practice of making detailed notes in Archibald's notebook for what he should try next makes one wonder if she is doing too much

directing of his work. What might be appropriate direction for a technician would not be appropriate for a senior graduate student who should be practicing experimental design skills. (See Discussion Question 3.)

As noted, we do not know what kind of relationship Archibald and Baker have had up to the exchanges recorded in this case study. What is likely to happen as this case is used with a group is that each person will project his/her own experiences and biases onto these two characters. That is good for the discussion if it engages the participants and helps them to reflect on their own relationships and what could be improved. However, it could be a problem if the participants start making assumptions about the personalities or motives of these two characters and then base their ethical analyses on these assumptions. We don't know if Baker is a long-suffering junior faculty member working with a graduate student who can't seem to see beyond his own dissertation, or if Archibald is a bright, motivated graduate student struggling under an adviser who doesn't tell lab members what the overall plan is and who wants to control every aspect of every experiment run in her lab. In facilitating discussion of this case, I suggest taking a neutral view of both characters. Assume that they are acting in good faith, and beware of assumptions that discussion participants may be making. However, the discussion also should explore the possible differences if we assume that Baker is a micro-manager or Archibald a short-sighted student. The possible consequences of a proposed course of action might change, but usually the affected parties' rights and interests, and the ethical principles and obligations, do not.

Some people might question whether the conflicts presented in this case aren't more issues of etiquette than of ethics. Because they deal with how people ought to treat each other, they are ethical issues. Many scientific societies and writers in the field of research ethics have argued that the treatment of graduate students is an issue in research ethics. In their report *Responsible Science: Ensuring the Integrity of the Research Process*, an NAS committee includes "[i]nadequately supervising research subordinates or exploiting them" among questionable research practices, "actions which violate traditional values of the research enterprise and that may be detrimental to the research process." In describing best practices, they note that "[s]cientists in universities accept the obligation to pass along knowledge and skills to the next generation of scientists," and that "[t]he mentor has the responsibility to supervise the trainee's progress closely and to interact personally with the trainee on a regular basis in such as way as to make the training experience a meaningful

one." (National Academy of Sciences, 1992, Vol. 1, pp. 28, 141-42) Weil and Arzbaecher assert that with regard to relationships within research groups going sour "[w]e can collect these ways of going astray under broader ethical questions about how to wield power responsibly and how to behave responsibly as one dependent on the power of others. As we proceed to point out the kinds of standards and practices that are needed, we thereby delineate role responsibilities in research groups. To fail to fulfill these role responsibilities would be to behave irresponsibly, that is, unethically." (Weil and Arzbaecher, 1997, p. 78)

Discussion Questions

Questions 1 and 2

Baker's reaction to Archibald's announcement that he had gone ahead and tried the CTAB indicates that there may have been a better way either to go about the experiment, or to tell Baker about it. That does not mean that doing the experiment was "wrong." Archibald was not squandering significant laboratory resources or endangering other members of the lab, and he did try Baker's suggestion first. He was trying something that others had used with success but which Baker had told him not to do. It is not clear why she told him not to try CTAB. Was it because she wanted to control every detail of work in the lab, or because protein purified in the presence of a detergent like CTAB was worthless for their research? It is unreasonable to expect that an adviser should okay the details of everything a graduate student does. However, Archibald could have done things a little differently and possibly avoided Baker's angry response. For instance, he could have asked Baker earlier for a clarification as to why she opposed his testing CTAB. The ensuing discussion might have led to some sort of understanding. Or he could have presented the results differently. Instead of announcing the wonderful purification as he did, he could have started by describing how he carefully tried all Baker's suggestions and then decided to try CTAB while he was at it. He could have told Baker, "I know that protein purified with detergent is not useful for our studies, but I was starting to wonder if active cambin could be purified at all. At least I now know that it is possible, and we just have to figure out how to keep it active in the absence of detergent." He needs to respect his adviser-student relationship with Baker, but he must also remember that he is part of a research team and not just a pair of hands.

Archibald's chosen course of action, although not "wrong," probably was not the

best choice. The tone of Baker's response, however, was clearly inappropriate and arguably "wrong." She responded as if she were scolding a child, not talking with a junior colleague in the presence of other members of the lab. (Recall that the setting is a lab meeting; we can assume others are present even if we do not hear from them.) In addition, it would take a very special set of circumstances to justify the command to a graduate student that he "never conduct experiments without my explicit approval!" It might be justified if he were a first year student just starting in research, or if he had a history of endangering others or wasting time and materials on poorly designed, inconclusive experiments. However, the essence of science is exploration and discovery: To deny a student the opportunity to try some of his own ideas is to deny him the opportunity to develop into a mature scientific investigator.

Question 3

This question asks whether Baker has the authority to control all experiments in her laboratory. For a number of reasons, the ultimate answer is "yes." I would add several qualifiers, however: that she should include others in her decision making, and that she should be sure to provide opportunities for graduate students and post-docs to participate in the decision-making process as a part of their training. However, she is the one held responsible for the funds granted to the lab, for the safety of all in the lab, for the validity of work published by the lab, and for the lab's progress in its research. Therefore, she does and must have final authority for what is done in her name in her laboratory.

Although she has the authority, that does not give her the right to act in a dictatorial or arbitrary manner. In addition, the different types of researchers in her laboratory need to have different amounts of freedom in their design of experimental approaches. A post-doc is like an apprentice scientist, just one step away from independent research and often the recipient of a stipendiary grant and funds for research materials. However, the post-doc usually has received the grant to do a certain project in a certain lab and is still considered a trainee. Thus, some guidance and supervision is appropriate. At the other end of the spectrum is the relatively unskilled technician who follows protocols prepared by others and may not even participate in the interpretation of the data collected. Between the post-doc apprentice and the hired hands of the technician is the graduate student. As part of their training, graduate students must be part of the experimental design process so that they can learn and develop their skills. The level of their

participation should increase over time as they complete their graduate work. Thus, the level of faculty guidance given to a first-year student would not be appropriate for a fourth-year student. However, a completely hands-off style is never appropriate for reasons of student training and faculty responsibility.

Deciding whether Archibald's committee needs to be informed about this incident requires that we know if it was an isolated occurrence on a particularly bad Monday morning, or if it represents a pattern of micro-management and dictatorial behavior by Baker toward Archibald. Archibald could experience negative consequences if he takes this conflict outside the lab, even if it is to his dissertation committee. Thus, he must weigh his options carefully, and, if possible, unemotionally. If this incident does represent a pattern, then Archibald should go to the dissertation committee to seek redress of a situation in which he, and possibly other students in the lab, is not being trained as a predoctoral student should be.

Questions 4 and 5

No level of pressure of any type on Baker would justify a disrespectful and dictatorial response to a graduate student. However, because of the fact that she is responsible for the use of grant funds and for the reasons mentioned in the comments above, Baker does have the authority and responsibility to oversee the experiments carried out in her laboratory. She needs to change the way in which she exerts this authority.

We often hear people say that the pressures of contemporary science justify inappropriate actions, even fraud. "Pressure" is not a valid ethical factor. True, we do need to be cognizant of the pressures confronting us and try to reduce them if possible, but we can't use them to excuse inappropriate actions. The pressure on a junior faculty member to secure continued funding is not only related to getting tenure. It also involves concerns about having enough money to keep members of the lab employed, maintain student support, and be able to pay the bills for expensive reagents so that all can do their experiments. Baker may see the use of a unique, detergent-free purification for the proteins studied in the lab as the hook that will secure the continued funding, but she needs to explain her reasoning to others in her lab so that they will understand and learn from her.

Question 6

In discussions of cases like this one, we frequently spend a lot of time talking about

the rights of graduate students, probably because these rights are often disregarded. However, it is also important to explore the other side -- the responsibilities of students. After all, education is not a passive endeavor. In this case, we learn that Archibald has been reading papers describing purification protocols similar to his own, and that is exactly what he should be doing. But I am puzzled as to why he does not understand the significance of the detergent-free protocol used in the Baker lab. From the information given in the case, it is not clear if the fault for this lapse lies primarily with Archibald or Baker. Has Baker failed to be clear or forthcoming with her reasons? Has Archibald failed to ask, or has he failed to pay attention to Baker's answers? We don't know, but both must bear some of the blame for the situation.

It has been noted that "The term 'mentoring' refers to an interactive process; The role of the mentored person is not a passive one. That person has a responsibility to seek information and guidance and to be ready to make use of it." (Weil and Arzbaecher, 1997, p. 77) A student should be open to, and even seek out, additional information and the perspectives of others, particularly those who are more experienced. Then the student should develop a reasoned position of his/her own to contribute to the discussion. In the end, it is hoped that student and adviser will arrive at a consensus as to how to proceed; failing that, however, the authority of the adviser who is head of the lab must be respected. This situation differs from that in History, for instance, where students typically work independently of all others in libraries or archives, and the dissertation adviser may not be a coauthor on any work that is published. But all graduate students should acknowledge the greater experience of their adviser and the fact that they asked this faculty member to guide their work, and so act on their adviser's suggestions or at the very least give them serious consideration.

Question 7

Consideration of the two principal questions raised here will probably be the most valuable part of the discussion of this case. How could this situation have been avoided? And what should Archibald and Baker do in the future? As noted above, it is not clear who bears the greatest share of blame for the current situation, nor do we know what Archibald and Baker's previous relationship has been like. Therefore, there are no definitive answers to these questions. Rather, they serve to help all of us to consider how to improve communication and thus relationships within our own research groups. Brainstorming and sharing ideas and experiences will be very

helpful if coupled with an evaluation of what is likely to be most successful in a given situation.

I offer two suggestions. It would be helpful if there were an opportunity for members of a research group to discuss their expectations of each other before a crisis occurs. Perhaps this case or the vignette entitled "The Lab of Last Resorts" (Weil and Arzbaecher 1997, p. 79) could be used to trigger the discussion. Baker's lab and others also could benefit from more discussion of the "big picture" by the lab director so that all would know how their work fits together into a whole. This orientation could be provided through regular presentations by the director at lab meetings, or by cooperative preparation of grant applications.

References

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