Collaboration

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Summary

Communication
The nature of collaborations is variable, but responsible collaborations are always defined by openness and early, on-going communication. Science is a communal enterprise; both science and society are best served by collegiality and open collaboration. There should be a mutual understanding of what is to be exchanged through the collaboration, how the research will be undertaken, and how the products of the collaboration will be shared. Collaboration is most likely to succeed if expectations are clearly communicated (and perhaps documented) before commitments are made.

Background

For many reasons, science increasingly depends on collaborations. First, no single person has the skills, knowledge, and resources to address all research problems; a judicious choice of collaborators can save considerable time and money. Second, the funding and structure of science tend to favor programs in which recognized authorities are involved from each key area. Third, breakthroughs are often more likely to come from collaboration across disciplines than by adherence to tried and true methods. Fourth, collaboration between the private sector and academia is being encouraged by legislation (e.g., the Bayh-Dole Patent Reform Act of 1980 allowed universities to negotiate patent rights with industrial partners), industry (which recognizes the benefits of the expertise and reputation of academics), and academia itself (which can benefit from immediate and long-term sources of private funding). Finally, collaborations are easier now than before. With obvious improvements in communication (phone, fax, e-mail), shipping (one-day delivery), and travel (to national and international conferences), potential collaborators are more likely to find each other and are more able to maintain their collaboration. Whatever the reason, collaborations are increasingly beneficial and possible.

Nevertheless, collaborations are also a frequent source of problems, in part because collaboration can take such different forms. It certainly implies two or more people

having joined together for a common purpose, but this might involve almost any arrangement of shared time, work, resources, unique materials, data, ideas, or money. Once the work is completed, credit and responsibility might then be shared in a number of ways. Collaborations may not even begin because of reluctance to share or work together (Cohen, 1995), and if started, collaborations can be marred by misunderstandings of what is to be provided by each of the participants, unhappiness with a slow collaborator, disagreement about what and when to publish, or conflicts regarding authorship and credit. (Kahn et al., 2000; Wilcox, 1998). Although there is no panacea for such problems, it is evident that any solution needs to begin with improved communication.

Regulations and Guidelines

A number of professional societies and journals have published guidelines that address various aspects of collaborations. For example, in 1995, the American Academy of Microbiology published a document summarizing many of the important issues in collaborations plus suggested guidelines for successful collaboration (Macrina et al., 1995). Another report, with a focus on universities and industry, makes a variety of suggestions about how to overcome the existing barriers to collaboration (National Academy of Sciences et al., 1999).

The process of collaboration is regulated primarily at the institutional level, not by the funders, public or private, of the research. The presumption is that the community is best served by minimal barriers to free and open collaboration. However, the outcomes of collaboration, particularly patents and copyrights, are restricted by both public and private funders of research. Moreover, nearly all institutions have rules and guidelines governing collaboration. For example, most academic institutions have explicit rules governing ownership of the products of work done by employees of the institution; material transfer; and limitations on academic-industrial agreements that might compromise the institution's academic mission. Some institutions also have guidelines for issues such as sharing and ownership of data, assignment of authorship, and credit and responsibilities for authors (Eastwood et al., 2001). It is increasingly the case that collaboration with someone outside of an institution cannot proceed without involving the institution.

Discussion

Case Study 1[i]

Along with Drs. Hopkins and Carpender, you have submitted a co-authored paper reporting on the regulation of a gene introduced by transfection into fibroblasts. The paper is returned from the editor with two very positive reviews, suggesting only minor revisions. While the paper is being revised, one of Hopkins' postdocs presents data at an lab meeting demonstrating that the results of the gene regulation experiments are dependent on the concentration of DNA used to transfect the cells. She presents data

showing that if the concentration of the gene construct is increased five-fold, the previously reported regulatory effects are completely abolished. In light of these results, Hopkins argues that the paper should be withdrawn and not allowed to go to press. Carpender strongly objects to this. He argues that the results of the paper are reproducible and the interpretations of the results straightforward. He further argues that the new results may be the basis for a whole new paper, and that these data shouldn't even be mentioned in the paper. Carpender argues that the paper be published with the minor revisions suggested by the reviewers.

Case Study 2[ii]

Bill and Sara meet in an introductory graduate course and over the span of the upcoming academic year, fall in love and get married. At the beginning of the second year they select different mentors in the same department and begin their dissertation research. The mentors and their groups frequently collaborate and co-author publications. They both work extremely hard, but frequently has Bill help her in the lab. On weekends they are commonly seen working together doing experiments which are exclusively part of Sara's research project. Over the course of the next three years Sara prepares 6 senior authored manuscripts and all are published in peer-reviewed journals. Bill is not included as an author on any of the papers, but he is acknowledged in 5 of them. In her last year in the program, Sara wins the prestigious graduate student honors day award and is also selected by the departmental faculty to receive the outstanding graduate student annual award. Recently, Sara has been offered a permanent position in a biotechnology company. Bill is not likely to be finished with his dissertation research anytime soon, and has no publications or even abstracts to his name. A small group of graduate students meet with you, the departmental chair, and bitterly complain that Sara has had an unfair advantage during her graduate research career. They claim her publication record is deceptive as it fails to account for all the "extra collaborative help" she received from her spouse. They claim both she and her mentor are party to inappropriate practices. They want you to intervene in some way.

Case Study 3[iii]

Two graduate students (Sven and Oren) in the same research group in a political science department submit a paper to a conference. The paper utilizes publicly available data in a new way to study the role of the judiciary in regulating conflict in Nigeria. After seeing the paper on the agenda of an upcoming conference, another student (Corey) in the same research group in the same department contacts the PI (Dr. Smith). Corey claims that his dissertation proposal was on the same topic, also in Nigeria, and accuses Sven and Oren of plagiarism. He argues that his proposal gives him the exclusive right within the group to publish on the data, even though he has not had the chance to do anything with it yet. Sven and Oren argue that the data are publicly available, that they weren't aware of the contents of Corey's proposal, and that Corey would not have any recourse to even contact them if they weren't in the same research group. Dr. Smith concludes that research group members have a responsibility to avail themselves of each other's dissertation proposals, and that Sven and Oren should include Corey as a coauthor on the paper.

Discussion Questions

1. For your area of research, what are some specific benefits you could gain from collaborating with others? What are the costs? What are the risks?
2. What issues are most likely to cause disagreements among collaborators working in your field of research? What problems, if any, are unique to your field of research?
3. What steps can you take, or recommend, that would decrease the risk of miscommunication in future collaborations?
4. What rules govern the transfer of material into and out of your institution?

Additional Considerations

Cultural Communication Barriers

While successful collaborations depend on explicit communication, such communication is often difficult. In some cases, different cultural backgrounds are an impediment to understanding. The culture of, for instance, the private sector emphasizes discovery and application of profitable products while academics may be more interested in mechanisms and new discoveries. In international collaborations, participants may literally speak different languages. Even when a common language is available, participants may have very different styles and understandings of communication as well as different perspectives on sharing and ownership.

Disciplinary Communication Barriers

Different research disciplines can also be a source of miscommunication. Because of the nature of the work, some disciplines may have very different expectations about hours to be worked (e.g., many biochemical and molecular biological studies require long hours), standards of proof (e.g., different disciplines have developed different views about the need for statistical methods), or the pace of work (e.g., high quality electron microscopy can often be elusive and require many days or weeks of searching for acceptable images long after a study has been otherwise completed). Similarly, communication across disciplines can be impaired by different understandings about the science, vocabulary, or methods.

Individual Communication Barriers

Different individuals can simply have very different standards and interpersonal styles. Some people consider a verbal agreement to be binding, while others prefer explicit, written contracts. Some favor rapid publication of each new finding; others prefer to amass a body of work for a single large publication. Some are convinced that authorship and credit should be reserved only for those who have made the most substantial contribution to the study; others are much freer in assigning credit. Some readily and clearly speak their minds; others are more withdrawn and will volunteer information only if asked.

Risks of Collaboration

Collaboration is in the best spirit of science, but opening a collaboration can leave a scientist vulnerable to the actions, or inaction, of his or her collaborators. Therefore,

choosing colleagues should be based not only on the science, but also on the likelihood of amicable relationships in which lines of communication can be kept open.

Communication of Expectations
Although guidelines or regulations do not explicitly cover all these aspects of collaboration, the goal should be communication that clarifies expectations of all parties involved. It may not be necessary to put everything in writing, but attempts should be made to explicitly address relevant issues.

Resources

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Endnotes

[i] © ASM Press, 2000, Scientific Integrity by F.L. Macrina, used with permission.
[ii] © ASM Press, 2000, Scientific Integrity by F.L. Macrina, used with permission.
[iii] Case contributed by Brigitte Zimmerman, UC San Diego, 2012