2022 Undergraduate Workshop on Responsible Conduct of Research (RCR)

INTRODUCTION. *The goal of this workshop is to promote discussion of authorship. Questions that the individual groups should consider include these: What are the considerations that underlie authorship decisions? What are the criteria typically used in making authorship decisions? In a list of authors, what is the significance of the order of names in the list? How can conflicts regarding authorship be avoided? If conflicts about authorship do arise, what are the available paths to resolve those conflicts? It is not essential that each group discuss all of the cases or all of the scenarios in each case. For some of the questions that may come up, clear ethical and professional considerations may be apparent that should lead one to a straightforward answer. In other cases, variations in practices may occur across disciplines, or a spectrum of answers may be acceptable, depending on the circumstances, and therefore no one "right" or "wrong" answer is obvious.*

In discussing the cases, focus on why an action is acceptable or unacceptable:
- *Who has a stake in the action?*
- *What might be the consequences of the action?*
- *What might be the obligations of the protagonist?*
- *What professional norms and values might give rise to those obligations?*

At the end of the 60-minute discussion period, each group should formulate one or two questions that they think would be of general interest for the panel to discuss. The panel moderator will select a few of these questions and address them to the panelists.

CASE STUDIES

CASE 1: How important is it for an undergraduate student to be a co-author on a research paper?

Harry Gupta is a sophomore chemistry major at a well-known university, and his plans are to eventually obtain a Ph.D. and pursue a career in research. He interviews the faculty heads (PIs) of three medium-sized labs, all carrying out research that is interesting to him. Harry has heard that for admission to top Ph.D. programs, it is expected that undergrads will have been a co-author on a major research paper. Thus, he starts each of the interviews--with Professors Husseini, Gonsalves, and Jorgenson--with the same question, *"If I join your lab, how likely is it that I will become a co-author on a paper by my senior year?"*

Professor Sarah Husseini at first is taken aback at this question and then responds that her goal for undergrads in the lab is to learn as much as possible about how to pursue research in his area and that while undergrads sometimes are included as authors on papers, over her many years on the faculty this has been the outcome for less than one-half of the students. Further, she adds that often such a paper is finally published after the student has graduated. She concludes with the comment that given Harry's excellent academic record and interest in research, she is willing to give him a place in the lab if that is what he wants.

In the next interview, Professor Simone Gonsalves responds to the same question with her own question "*What makes you think that being a co-author as an undergrad is so important?"* and then adds, *"I'm worried that focusing on authorship will detract from your ability to work with the required intensity on the research."* Harry senses that she might be antagonistic toward him. But at the end of the interview, she agrees to take him into the lab.

In the final interview, Professor Gunnar Jorgenson responds to the question by saying that his lab has a large number of undergrads and that most of them do become co-authors. He explains that they are so successful in this regard because they spend most of their time in the lab "shadowing" a senior grad student or postdoc, helping him/her carry out standard procedures or analyze data. Or sometimes he assigns several undergrads to work together on a single project, with the understanding that all will be coauthors if the project comes to fruition. In other words, each undergrad is not assigned a research project of his/her own. Jorgenson commits to taking Harry if Harry wants.

CASE 1 STUDY QUESTIONS:

1) Assuming that he is equally interested in the three areas of research represented by these PIs, which lab should Harry pick? Should the three PIs' comments about authorship play a role in his decision?

2) What other questions do you think Harry should be asking in the interviews?

CASE 2: Who is an appropriate author?

(Modified from Case Study #1, *Columbia University Center for New Media Teaching & Learning*)

***NOTE that this case has three different but related scenarios. Think about each independently, focusing on how it illuminates different aspects of decisions about authorship.*

Sandra Potemkin is an undergraduate student majoring in biochemistry and molecular biology at Manton College, a small liberal arts college that does not have extensive opportunities for cutting-edge research in this field. With the strong support of her honors thesis and academic advisor, Dr. Harry Milstein, she arranges a full-time summer research internship at a prestigious larger institution between her sophomore and junior year. Then the following summer she has the opportunity to join the same lab again, applying the techniques that she learned to a challenging and competitive project. The PI of the lab is Dr. Cynthia Peterson, who is world-renowned and has a large and well-funded laboratory. Dr. Milstein, whose own training is in the same area as Peterson's, is thrilled that Sandra will be able to sample cutting-edge research that is closely related to her own research interests in the minimally funded lab that he maintains for undergrads at Manton College.

At the beginning of the second summer in Peterson's lab, Sandra is greeted warmly as a member of the team. She is included with the graduate students and postdoctoral fellows in the weekly laboratory meetings, in which there is a free exchange of ideas about the ongoing projects. She functions almost like a senior Ph.D. student. In addition, she meets weekly, one-on-one, with Dr. Peterson, who provides scientific advice and one or two specific recommendations, which advance her work. Sandra also regularly discusses her results with Dr. Milstein, her mentor back at Manton college. These interactions also push her research ahead, which she plans to write up as an undergraduate honors thesis.

Sandra makes good progress during the second summer that she spends in Dr. Peterson's laboratory. Sandra prepares a rough draft of a paper incorporating her findings, putting herself down as the first author, since this has been "her" project all along. She puts Dr. Peterson as the second author and Dr. Milstein as the last author on the paper. At the end of the paper, she writes an acknowledgment to a postdoc, Cathy Sonnenborg, who showed her several techniques and worked with her on a few experiments.

Sandra based her listing of authors on her understanding of the guidelines put forth by the International Committee of Medical Journal Editors (ICMJE), which say that an author is someone who (a) has made significant contributions to the conception and design, or to the acquisition of data, or to the analysis and interpretation of data; (b) was involved in drafting the article or revising it critically for important intellectual content; (c) provided final approval of the version to be published, and (d) agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The guidelines, which are followed by approximately 500 medical journals, say that all four criteria should be met for authorship.

[***Scenario A***]. Sandra gives Dr. Milstein and Dr. Peterson a copy of her rough draft, asking them for feedback. Dr. Milstein sends several comments by e-mail to Sandra, who is pleased that her thesis mentor is basically very positive and whose comments are easy to incorporate. Dr. Peterson sends her comments back as well, and they also are positive and straightforward for her to address. But in addition, Dr. Peterson changes the authorship list to include not only Sandra as the first author and herself and Milstein but also Cathy Sonnenborg, the post-doc in the lab who helped Sandra with some techniques.

Sandra is shocked that Dr. Peterson added Cathy as an author. Sandra responds to the PI by reciting the ICMJE guidelines, as she understands them, maintaining that the major intellectual and physical work in preparing the paper was done by her and by Peterson and Milstein. Dr. Peterson is equally surprised by Sandra's feelings, responding that she benefited from the input of all the other lab members and in particular Cathy. Peterson adds that a graduate student in the laboratory is writing a paper that is based on some exciting findings for which Sandra contributed interpretative insight and that she intends that Sandra will be included as an author. Peterson insists to Sandra that the contributions of the post-doc are sufficient to satisfy the ICMJE guidelines.

[***Scenario B***] Suppose Cathy Sonnenborg not only helped Sandra in the modest way described above but that she obtained the data for two of the seven figures in the manuscript. Realizing that these figures are important parts of the paper, Sandra includes Cathy's name in the list of authors, placing Cathy's second, after her own which is first. Dr. Peterson reads and makes minor corrections to the manuscript, same as in *[A]*. But in this scenario, she puts an asterisk after Sandra's name and after Cathy's name, with the notation that *"these authors contributed equally to this work"*, in other words indicating that they are "co-first authors". Sandra is upset at this change since in her view, the project was mostly thought out by her, with help from her undergraduate thesis mentor Dr. Milstein.

[***Scenario C***] Sandra gives Dr. Peterson and Dr. Milstein a draft of her manuscript, asking them to provide feedback. Dr. Peterson sends her comments back to Sandra, and they are basically positive and are straightforward to address. In addition, Dr. Peterson changes the order of the authors so that Peterson now is last on the list of authors, and Milstein is listed next-to-last. Milstein is unhappy with this change but does not want to confront Peterson, given her stature in the field.

CASE 2 STUDY QUESTIONS:

1) What are the differences in the issues underlying scenarios [A], [B], and [C]?
2) Who, in the end, is in charge of making decisions about authorship?
3) In a multi-author paper, how important (perceived and actual) is the order of the authors?
4) Do you agree with Sandra in scenario [A]? Scenario [B]? Why or why not?
5) How might the differences in opinions about authorship in scenarios [A] and [B] be resolved?
6) (a) What special significance is conventionally assigned to the last author in the list of authors? (b) Do you agree with Peterson's choice of authorship order in scenario [C]? Why or why not? (c) What do you think Harry Milstein should do?
7) If you were Sandra and were unwilling to accept Peterson's authorship decisions, what recourse would you have here at Cornell?
8) In the modern-day, often papers are collaborations between labs that have very different expertise, sometimes with some authors not having the background to understand the data analysis from the other lab. In general, how should authors try (or should they try?) to satisfy the ICMJE guidelines that all authors should be accountable for all the published results?

CASE 3: How do judgments on the "quality" of research influence decisions about authorship? (Modified from *Online Ethics Center for Engineering and Science*)

***NOTE that this case has two different but related scenarios (A and B). Think about each scenario independently, focusing on how it illuminates different aspects of decisions about authorship.*

As an undergraduate student, Gary Johnson started already as a freshman doing research in the laboratory of Dr. Alex Holiday. Gary was a pre-grad student with a passion for research. He had set his sights on a Ph.D. at a top grad school, and then ultimately set up his own lab and teaching at a university. He carried out the research for his first 5 semesters, and also over one entire summer when he stayed on campus. His project was to study the properties of a certain mammalian cell protein. This involved diverse and challenging techniques, including making mutations in the protein, expressing and purifying the protein from E. coli, and testing for function in a mammalian cell culture system, the latter requiring advanced microscopy techniques. In complexity, this project approached that of a Ph.D. thesis project. Gary regularly presented his data at weekly laboratory meetings attended by all members of the lab. Gary's grades were not stellar, and so he banked on the assumption that his data would form a major part of a publication, which he hoped would help him be accepted into a top Ph.D. program.

Dr. Holiday assigned a grad student, Carolyn Wu, to be Gary Johnson's lab mentor. She was having difficulty with her own project and seemed reluctant to be a mentor to an undergrad. Gary felt that she always talked down to him. Gary also was uncomfortable around Dr. Holiday, who seemed to feel that Gary required more supervision than expected of an experienced undergraduate student and that Gary was not an independent thinker. On the other hand, in Gary's opinion, Dr. Holiday expected too much from his undergraduate students, and as PI he failed to provide adequate direction to the lab's undergrads. In assessing Gary's work, Dr. Holiday relied only on the judgments of Carolyn Wu, who seemed to Gary to be prejudiced against him. Therefore, after obtaining a lot of data relevant to the project, accumulated over five semesters and a summer, Gary decided to leave the lab. He picked a new honors thesis advisor in the same department and then began working in that laboratory. His lab book remained in Holiday's lab, as is required in such cases. When Gary left, Dr. Holiday told him that his results probably were not sufficiently solid to merit inclusion in a future publication.

[*Scenario A*]. Approximately one year later, now in his senior year, Gary is told by a fellow student now working in the Holiday lab that data similar or identical to those Gary himself had obtained over the five semesters in the Holiday lab is part of a manuscript that is being submitted for publication in a major journal. The manuscript does not list him as an author. Gary is really unhappy to hear that he apparently will not receive authorship credit for his hard work.

[*Scenario B*]. Now in his senior year, Gary notices that a paper that includes him as an author has just been published from the Holliday lab. He was never notified that this paper was being written. On looking carefully at the data in the paper, he realizes that the data in some of the figures look like the data he himself had obtained and that was in the notebook he left with Dr. Holiday. Gary is troubled that he was not shown the manuscript that was submitted for publication, and thus had no chance to comment on it.

CASE 3 STUDY QUESTIONS:

1) How should Gary proceed? If he believes that he was wronged, what avenues could he pursue to argue his case? The answers may be different for Scenarios A and B.
2) Suppose in [A] that the manuscript reported results of experiments just like those that Gary had generated, but that the actual data were not from Gary himself but from one of the co-authors who had repeated his experiments. Should Gary be a co-author since he did the original experiments? Why or why not?
3) What are appropriate criteria for a lab head to use in deciding the minimum "quality" and "quantity" of data in order for the data to be included in a paper?

CAMPUS RESOURCES

The Office of Research Integrity and Assurance (ORIA), rcr@cornell.edu
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