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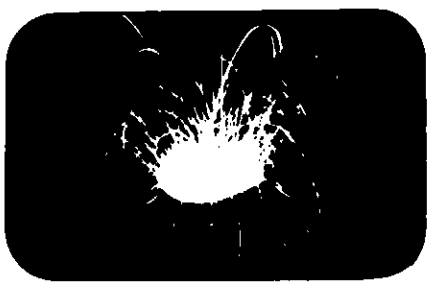

Pyroclasts

Joint Authorship and its Recurring Problems: A Matter of Respect

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We all know of situations in the publishing of scientific papers where things go wrong. As Editor of the *Canadian Journal of Earth Sciences (CJES)* for the last few years, I have seen several situations in which unwanted conflict developed over the authorship or content of papers. I have had doubts on occasions as to whether particular individuals should have been co-authors. I have questioned where the responsibility lies for poorly prepared manuscripts, particularly some authored by graduate students. A common thread to all these concerns is that problems could have been avoided by individuals taking their responsibilities as authors more seriously and by showing more respect for the role of other scientists.

DEFINITION OF AUTHORSHIP

Authorship can be an issue in a science where research is commonly carried out by teams, but in which some new findings have a strong component of chance. Some scientific projects can be planned from the beginning, but commonly the focus of papers only emerges after research work has been done. The policy of *CJES*, similar to that of most scientific journals, is that "each author must have made a significant and continuing intellectual contribution to the paper, must have read and agreed to the contents prior to submission and that except where contributing only a specific identified expertise, or where disagreement between authors is explicitly noted, must be willing to defend the contents of the paper publicly." Note that this definition of authorship excludes a person whose sole role has been to find funding for the project or to organize fieldwork. It excludes a person who provides some initial hypothesis or speculation, but is not involved in the study on a continuing basis. Both of these deserve mention in the acknowledgments. Authors may include a paleontological or geochronological specialist, but if the involvement of that scientist ends at provision of the species name or the date, that fact should be indicated in a footnote.

Eschew honorary authorships. The senior scientist who found the funding and has had peripheral involvement in the paper, but has not made a significant and continuing intellectual contribution, should not be an author. The junior colleague who is looking for a job or up for tenure, but who only helped carry some large geochrononological samples out of the gorge through the rain, should not be a co-author. As an author, you should show respect to the community in which you work by not including as co-authors those who have not contributed appropriately. Would you write a deliberately false letter of recommendation? If you are included inappropriately as an author of a paper, it is your responsibility to decline the offer. On the other hand, it is a courtesy to send a copy of a submitted manuscript to those who have played a role in raising funding or assisting in the field. It allows potential conflicts regarding authorship to be dealt with *before* the nasty shock of seeing the paper in print.

Who should be first author is less of a problem. The one who writes most of the text is a sensible guideline; the one who has played the most important intellectual role is probably more appropriate, but in practice this may be difficult to apply. Alternation or by lot are other acceptable schemes where all the authors have played an equally important role in the paper. Unless second and subsequent authors are listed in alphabetical order, it is generally interpreted that authors lower on the list have played a lesser role.

THE RESPONSIBILITIES OF ALL AUTHORS

Authorship carries responsibility. You should not, as a co-author, let a paper be submitted that does not contain substantial science, is not written efficiently, or is not well focussed. Personal relationships between authors may interfere with this noble goal. I have been embarrassed by highly critical comments on a paper of which I was second author, suggesting that the paper had been inadequately prepared. I had, in fact, done a lot of work on it, but had tried to preserve some of the original (but unsatisfactory) organization, emphasis and phraseology of my co-author. What I should have done was to get my co-author's agreement to send it to a critical colleague before submitting it to the journal, and to use that informal review as a basis of further revision. That would have shown more respect to the referees who had to read a substandard paper.

Many organizations require internal review of papers before they are submitted to a journal. Referees selected by the journal are then usually able to focus on the scientific content of such manuscripts. Some manuscripts submitted to *CJES*, however, show clear evidence of hasty preparation; for example, immediately before the author goes to the field. Others appear to be submitted prematurely in the hope of getting the paper accepted before a grant application deadline. Prior to submission, a manuscript must be adequately reviewed informally, certainly by all co-authors and preferably also by a colleague more remote from the work. Not to do so is a discourtesy to journal referees, who are busy people and are meant to focus on the scientific content of manuscripts. Inadequate informal review usually results in substantial delays in the formal refereeing process. Both referees and editors have the natural human reaction of procrastinating on a review that is going to take a great deal of time and most editors will want a manuscript that has needed major revision to go through a second round of refereeing. Adequate preparation of a manuscript is not only your responsibility as an author but also in your own self interest.

THE SPECIAL CASE OF GRADUATE STUDENTS

The relationship between graduate student and supervisor probably creates the most difficulty in the matter of authorship. The graduate student puts in most of the labor. In some cases, the supervisor is the one who sees the scientific significance and leads the student to the important scientific conclusions. In other cases, the student may feel, correctly, that the supervisor has had little intellectual input into the thesis beyond initially identifying the problem. The normal dynamic that exists between authors who are established professional geologists is disturbed by the particular relationship between the university, the student, and the supervisor. Publication and authorship are influenced by university policies: whether published papers can form a thesis, what a student can expect to get for paying fees (commonly from the supervisor's grant), and the time limits on finishing theses. The relationship between the university, supervisor and student should be clear to all parties at the onset of the degree program. All parties need to respect each other and to try to keep various relationships within the process separated.

I think there are at least three types of relationship between graduate students and their advisors. There is an *educational relationship*: the student pays fees, works diligently, and maintains an academic standard and therefore can expect the university (largely through the supervisory committee) to provide guidance and direction during the educational process. A graduate science education should include instruction in oral and written presentation and the latter is not the job of journal referees. The geological community at large also has a responsibility to the diligent graduate student: to respect the importance of the educational process to the survival of our community and not to embark on a project already the subject of an ongoing thesis. There is also a *resource relationship*: the supervisor raises money to maintain equipment and facilities (owned by the university) used by the student and generally raises money to support the student. In return, the student owes it to the supervisor to work hard and finish the project in a timely manner. Authorship of any publications, ideally, should be kept separate from these two previous relationships. The *relationship between authors* should be decided on its own merits and not on the basis of an educational or resource relationship. Individuals who have mutual respect should be able to decide on authorship once a paper is planned or written. Who contributed significantly and intellectually to the paper? If the student was awarded a degree, that is presumably a measure of sufficient intellectual contribution for authorship or co-authorship. But if the supervisor significantly develops data in the thesis into a paper, then it may be that the supervisor is appropriately the first author. If a good Ph.D. student has used the supervisor as a sounding board and for guidance, but has been intellectually responsible for the development of the science and writes up the results, then it may be that the supervisor does not meet the criteria for co-authorship.

Graduate students reading this may question how theory is put into practice. Thus, members of your supervisory committee have made some intellectual contribution to your work, although you may question its significance. But you don't want to antagonize them, because you want to find a job or a post-doctoral fellowship. So you add their names to the paper that you have written. If so, at least press them to exercise their responsibilities, to read and contribute to the paper. "I would like to include you as a co-author if you could help straighten out the section on ... ." A few years ago, *CJES* received a paper from a graduate student, based on his thesis, and with four co-authors, all university faculty. The figures needed considerable revision and the photographs were not of publication quality. The student argued that he was unemployed and could not afford the improvements. I suggested that only if he were sole author was that a realistic excuse. All authors have responsibilities. Co-authors who are supervisors of a graduate student have a particular responsibility to guide the student through the publication process. Students should work through their faculty of graduate studies if this is not happening in their university.

Supervisors of graduate students and other professional scientists may recognize another problem. What about the student who either leaves without completing a thesis, or works so slowly that thesis work begins to lose its currency, or completes a thesis but never publishes anything from it? Students hold copyright on theses and many universities have policies on student ownership of data prior to completion of a thesis. Provided that relationships between student and supervisor remain cordial, then mutual agreement of the role of the supervisor in preparing a jointly-authored manuscript provides a sufficient guideline. Where the relationship has broken down, the legality and morality of the supervisor using data collected by the student depends on university guidelines and the nature of the resource relationship between student and supervisor. The question of the availability of thesis material for publication by others is governed by copyright law. Authors hold copyright on theses and extensive use of data is prohibited without permission of the author. Respect suggests that both the author and the supervisor of the thesis should be consulted before significant use is made of an unpublished thesis.

THE GOVERNMENT/ UNIVERSITY INTERFACE

The different organizational and intellectual environments of government and university scientists commonly lead to conflict, which could be largely avoided by mutual respect and understanding. I

illustrate the point by considering the stereotypes. The government scientist typically has a responsibility to map or to work on a thematic problem, to produce syntheses and to produce them in a timely manner. The government scientist may spend many summer months in the field. The university scientist may be more concerned with new scientific concepts than systematic work, probably has more projects on the go at any one time, and has timeliness determined to a considerable extent by the progress of students through the system. The university scientist has an obligation to identify and scope out potential graduate thesis problems, which may be done for example through undergraduate theses or by developing some regional territoriality. He or she may spend only short periods of time in the field, perhaps a week or two on each potential project. Both groups put a lot of effort into raising resources, but the products required for the scientist to maintain or acquire resources are commonly quite different.

The government scientist should respect the educational functions of the university system and the constraints that it places on many university scientists. Make yourself aware of what is going on in universities and don't duplicate work that you know a student is doing. Recognize that B.Sc. honors theses are commonly preliminary investigations for further research once a suitable graduate student is available. Respect the author's copyright of all theses and cite theses appropriately if you do use them in regional compilations.

At the same time, the university scientist should recognize the intellectual role that a government scientist is required to play. How often are regional geological maps (figures 1 or 2 of many papers) adequately cited back to the geologists who put in the long months in the field or in drawing together compilations over the winter? It is this regional work that provides a basis for much university field research. Certainly it is easier to work on the emplacement history of a composite pluton once someone else has mapped its distribution. Make sure that the geological mapping role is adequately acknowledged. Show some respect: putting a fault on a map may not be as intellectually challenging as understanding its origin, but a map may be the product that the government geologist is required to produce.

FINALLY

When preparing papers or maps for publication, remember to show respect for the contributions of others by adequate acknowledgment, paying particular care to the citation of theses and base maps. Ensure that if you are included as an author, you have pulled your weight intellectually in developing the science and in the mechanics of presenting the results. Do not belittle the work of those who have contributed by including as authors those who have not. Finally, show respect for referees by ensuring that the submitted manuscript is the best product that all the authors can produce.

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