

Where credit is due

Authors of research manuscripts should be aware of their authorship, have read the paper and agree with it. What else is required for co-authorship — and what merits only a mention in the acknowledgements — is less clear.

In a publish-or-perish academic world, another publication can make all the difference to a career. The pressure is on, therefore, to gain recognition for one's work in the form of co-authorship on papers. Perhaps it is a sign of such pressure that at *Nature Geoscience* we have recently encountered a number of requests for changes in author lists — sometimes even after papers were accepted — or suggestions from reviewers that the author list may be incomplete or inappropriately ordered. At Nature Research, we do not prescribe which kinds of contributions make authorship appropriate or who should be on a paper (for more information, see our stated policies at <http://go.nature.com/2ovFJpP>). But these instances raise the question of what level of involvement merits co-authorship.

An informal and anecdotal canvassing exercise among four of our authors and referees from different geoscience fields yielded a broad range of opinions, despite the small sample size. Specifically, divergences in opinion emerged for contributions such as: obtaining funding for a project or being head of a group; sharing a bright idea over coffee at a conference; being the chief scientist on a research cruise that supplied the data for a paper; developing and calibrating instruments; or helping with sample collection. Whether these merit co-authorship or a mere mention in the acknowledgements seems to fall within a broad grey area that could go either way.

Relatively clear-cut grounds for co-authorship include contribution or analysis of unpublished data that specifically address the research question in the paper; significant involvement in writing of the paper; or substantial input in the development of the research question combined with participation or guidance in how to address it. And there is unanimity within our small sample of researchers that as a minimum requirement, all authors should have read a paper (ideally before submission), have had a chance to comment, and agree with the main interpretations and conclusions.

But length of publication list is a poor proxy for scientific productivity. Imbalances occur, for example, between early career researchers who usually have to put much

time into each of their papers, and senior scientists who are more likely to be added to a paper in return for less time spent, sometimes no doubt in an effort by the first author to lend weight to the manuscript. Another imbalance disadvantages scientists working in small groups that publish fewer papers, compared to those at a similar career stage that are engaged in larger projects, such as planetary missions, with a policy to list all collaborators on every one of their many publications.

In the interest of accumulating a long publication record, it may seem that the best strategy for young researchers is to be generous in admitting collaborators to the author list and in return hope to be offered co-authorship on many papers. This strategy, however, leads to inflated author lists. As an antidote, sometimes research output is instead evaluated by a publication list that is normalized by the number of authors on each paper. Where this principle prevails, a publication with ten co-authors counts only for half as much as a five-author paper.

Such a procedure provides welcome incentives to limit co-authorship to those who have truly engaged intellectually with a paper and made a substantial contribution. But it is still too simplistic, because it does not account for the depth of involvement. At Nature Research, we aim to aid transparency by mandating a statement that specifies each author's contribution to every piece of original research we publish.

Conversely, author lists can be conspicuously short. We have, on a few occasions, received queries from reviewers of manuscript that describe research in parts of the world with a less developed scientific infrastructure, who wonder why no local scientists are on the author list. We feel that it is scientific best practice to work together with local researchers where possible, and to give them ample opportunity — and perhaps support — to contribute at a level that merits authorship. Such collaboration

can lend greater depth to a study, by embracing the local expertise that comes with having spent a life and career studying the region; it can also help build capacity and provide an opportunity for an exchange of ideas (<http://go.nature.com/2oocVPH>).

In any collaboration, it is important to be very clear right from the start about authorship requirements for any research output. The requests for post-submission changes in author lists that we have seen in the past months suggest that researchers who submit their work to us have not always discussed and agreed upon expectations ahead of submission.

Additions of authors come up relatively frequently during peer review, usually for obvious reasons: when a reviewer asks for an additional piece of evidence that does not fall within the collective expertise of the existing authors, they often bring in additional researchers. This is, of course, to be encouraged. However, we have also been asked to add authors after a paper has been accepted (in principle).

When any authors are removed, or when co-authors are added without an obvious reason, we ask for an explanation. For removals, most often the author in question feels that they have not contributed enough to have earned co-authorship; for late additions, we mostly hear that the existing authors have re-evaluated the importance of collaborator contributions. In both cases, we also ask all original co-authors (including those who are to be removed) to confirm in writing that they agree with the new list — which can cause delays in publication. These instances point to a breakdown of communication among authors that had best be avoided.

At *Nature Geoscience*, we take authorship very seriously. We encourage all our authors, current and prospective, to work with their institutions and communities towards clear guidelines on what makes a contributor a co-author. And to talk about their guiding principles with their collaborators well before a paper is written up. □



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