What is authorship?

Authorship of peer-reviewed publications is still the basis for universities to grant academic tenured appointments. It is used to measure the research output of each faculty member and determine potential research funding and individual-merit salary raises. It is, therefore, a fundamental issue in academia.

Recently, I received an invitation to review a paper for a journal that discloses the authors' names to reviewers. Once I started reading the paper it became obvious to me that it was very unlikely that one of the authors, an important name in the field, had read the paper – poorly written article, too many basic mistakes, wrong references, incorrect commercial names and compositions, and so forth. Some journals, including the *Journal of Adhesive Dentistry*, have started using contributor lists that indicate the role of each individual in the research project leading to the manuscript. Nevertheless, this measure has not discouraged what we call honorary authorships. Strange[12] used the term "promiscuous" or "abusive" authorship to define an authorship that is awarded to someone who has not contributed in an intellectually significant way to the manuscript.

Having reviewed an average of 54 papers per year over the last 15 years, I feel I can easily spot these aberrant situations. It almost looks like we are all trying to outsmart each other. As Fenning stated in 2004,[2] fraud offers big rewards for relatively little risk. I have read or reviewed a few of these papers that fit the same pattern of having an honorary author or a forged author. I know one author who has over 20 peer-reviewed publications in his/her CV, but has not written one paper nor has participated intellectually in any of the publications. I know another author who "specializes" in honorary authorships.

Below are the types of abusive authorship:[9,12]

- Honorary authorship: This is used by virtue of the status of the honorary author in the Institution (Chair, Laboratory Director) without that person having any contribution to the research project. In other instances, honorary authorship is used to give the paper a greater sense of legitimacy by listing as co-author a renowned figure in the field.
- Mutual support authorship: Different teams of researchers agree to place everyone's names in each other's manuscript to inflate the productivity of all teams. I'm sure we all know a few cases.
- Ghost authorship: Authors who contributed to the work but are not listed, generally to hide a conflict of interest. In dentistry, the ghost author may be associated with a manufacturer of dental materials.
- Forged authorship: An author's name is added to the paper, without his/her knowledge, to increase the likelihood of publication. Pignatelli et al[11] reported that 62% of authors found out that they were part of the authors' list only after publication.
- Orphan authorship or denial of authorship: Authors who contributed significantly to the work are not given the deserved credit, being omitted from the authors' list. Among 39 investigators interviewed, 41% reported that they had been unfairly left off author lists.[11]
- Guest or gift authorship: Authorship awarded out of friendship or family ties. There are cases of junior researchers giving authorship to senior colleagues who make decisions over their future career. There have also been cases of authorship as repayment for favors.
- Coercion authorship: When senior researchers use their experience and hierarchical position to distort the order of authors on publications and conference presentations, or use intimidation to gain authorship.

The issue of abusive authorship has been discussed for over 20 years. In 1988, a substantial proportion of articles in peer-reviewed medical journals demonstrated evidence of honorary authors or ghost authors.[3] In 2005, Kwok came up with the term "White Bull effect", inspired by Greek mythology, to label scientific misconduct from abusive co-authorship.[5] Unfortunately, many academic institutions do not have, or they do not enforce, policies on authorship listings.

In 2001, The International Committee of Medical Journal Editors (ICMJE, http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html) established a list of requirements for submission of manuscripts to biomedical journals. Other guidelines focus on how to handle authorship disputes or what to do if one suspects of ghost, guest or gift authorships.[13] While many researchers are willing to follow more rigorous criteria, many others will ignore them.[10]

The requirements for authorship issued by the ICMJE are very clear. Authorship credit should be based on:

- Substantial contributions to conception or design, or acquisition of data, or analysis and interpretation of data; AND
- Drafting the article or revising it critically for important intellectual content; AND

- Final approval of the version to be published; AND
- All authors should be able to take public responsibility for their contribution to the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Contributors who meet fewer than all 4 of the above criteria for authorship should not be listed as authors, but they still must be acknowledged. In addition, an author should be able to identify which co-authors are responsible for specific other parts of the work and have confidence in the integrity of the contributions of their co-authors. Examples of contributions that do not qualify for authorship but that should be acknowledged in the paper.[12]

1) Providing funding, technical advice, reagents, samples, or patient data.

2) Providing students or technical personnel who perform studies.

3) Routine collection of data.

4) General supervision of the research group.

In fact, many peer-review journals use these requirements. A full list of journals can be found in the Transparency in Author Contributions in Science webpage, http://www.nasonline.org/about-nas/Transparency_Author_Contributions.html.

It is acceptable for a paper to have multiple authors, provided that all authors fulfil the requirements for authorship. Sometime ago I was asked during a lecture at a meeting if I was truly involved as an author of clinical studies and other papers with multiple co-authors. I think that the person who asked the question was very diplomatic. I sensed that this person meant to ask "do you just add your name to the list of authors?" My answer was that I have to be involved from the research problem conception to the manuscript writing in order to qualify for being listed as co-author. In the case of clinical studies, in most cases I have traveled (without external funding) to the Institution where the study was carried out to participate in the study. Among others, I have collaborated in clinical studies with the following universities: State University of Ponta Grossa, Federal University of Santa Catarina, University of Valparaíso, UNIP São Paulo, Federal University of Ceará, University of Mogi das Cruzes, and so on. I visited them all at some point during the study or studies.

The issue related to the increasing number of authors per paper in the last two or three decades is alarming. In 1993 there was an average of 2 to 3 authors per paper, while in 2013 the number increased to 5 to 10.[6] It is remarkable that the number of papers with at least 100 authors (yes, one hundred!) in all journals increased from 1 in 1981 to 182 in 1994.[8] The number of manuscripts with more than one thousand authors has increased from zero in 2012 to 115 in 2016. A paper on the Higgs boson published in 2015 in *Physical Review Letters* holds the record, with 5154 co-authors.[1] The paper has 33 pages, 24 of which include the list of authors and respective affiliations. It is so easy to add authors that pets have been co-authors of important papers. Andre Geim, who won the 2010 Nobel Prize in physics, listed H.A.M.S. ter (pronounced "hamster") Tisha as co-author of a paper published in 2001 in *Physica B: Condensed Matter*, a peer-reviewed journal.[4] Tisha, the hamster, supposedly helped Prof. Geim with his famous levitation experiments. Another researcher, Polly Matzinger, studied the human immune system at NIH. She published a paper in 1978 with her dog as second author.[7] Dr. Matzinger did not feel comfortable being the sole author, as it then would not have made sense to write "we did", "we conclude", as required by the journal's instructions for authors. Thus, she added her dog to comply with proper grammar. A few years later, Dr. Matzinger made an interesting observation about having her dog Galadriel as second author: "Galadriel had done no less research than some other coauthors had". Maybe Dr. Matzinger meant that her dog Galadriel was not less honorary than other VIP honorary authors that she knew.

Let's all comply with the ethics of authorship.

Jorge Perdigão, DMD, MS, PhD
Associate Editor of JAD
University of Minnesota School of Dentistry,
Minneapolis, MN, USA
perdi001@umn.edu

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