Does it pay to have a "bigwig" as a co-author?

Peer-reviewed letter

Citation rates increase with increasing number of authors (Leimu and Koricheva 2005 a, b), and ecology-themed manuscripts with four or more authors are more likely to be accepted for publication (Tregenza 2002). This may reflect a direct collaboration benefit or a greater network of scientists who know or recognize the authors. Using a dataset of 313 papers published in *Oecologia* from 1998 to 2000, we tested whether the scientific status of an author or co-author affects the citation rate of the paper, and if papers written or co-authored by well-established and recognized scientists – the "bigwigs" – attract more citations than papers by lower profile authors. Such effects may be because bigwigs improve the quality of manuscripts that they are involved with, or because they attract citations due to their prestige; either way, this may be an important question for junior scientists when they are deciding whether to collaborate with a heavyweight colleague. We defined a "bigwig" as a person with an *h* index (Hirsch 2005) within the top 10% of the cumulative *h* value of authors in our dataset (total of 850 authors) – thus, ecologists with an $h \geq 35$ were considered as bigwigs.

Papers written or co-authored by bigwigs had, on average, higher citation rates than those without one (4.50 ± 0.27 and 2.97 ± 0.37, respectively; $F = 14.35$, $P = 0.0002$). However, this difference was significant only for papers with up to three authors, and disappeared when papers had ≥ 4 authors (author status × author number: $F = 4.97$, $P = 0.026$; Figure 1a). This may reflect a greater relative contribution of the bigwig to a paper with fewer authors or could arise because visually recognizing bigwig names is easier when the list contains fewer authors. Citation rates of papers with four or more authors were not significantly different whether a bigwig was involved or not, and citation rates tended to increase with author number for non-bigwig papers (suggesting that collaboration with lower profile authors still has benefits). In other words, the summed contribution of several low profile authors seems to counterbalance the benefit of a bigwig contribution in multi-authored papers. Interestingly, for bigwigs, there were no significant benefits from collaboration with lower profile authors, and the citation rates of papers with a bigwig as a co-author tended to decrease as the number of lower profile authors increased (Figure 1a). Collaborating and co-authoring can, however, still be beneficial for bigwigs, in terms of more publications generated and less effort required.

If the cumulative or average status (*h*) of authors increases as the number of authors on multi-authored, non-bigwig papers increases – so that the average or cumulative status for multi-authored papers is the same, irrespective of whether a bigwig is involved or not – then this could explain why the citation rates of multi-authored papers (with and without a bigwig co-author) do not differ. However, this was not the case; the average *h* was always lower and did not change with author number for papers without a bigwig involved (author status: $F = 308.90$, $P = 0.0001$; author number: $F = 0.19$, $P = 0.6617$; author status × author number: $F = 48.69$, $P = 0.0001$; Figure 1b). Single-authored bigwig papers had higher average *h* as compared with that in multi-authored bigwig papers, but there was also no increase in average *h* with author number for the multi-authored bigwig papers (Figure 1b). Furthermore, as expected, the cumulative *h* was higher for bigwig papers, and increased with author number for all papers (author status: $F = 228.31$, $P = 0.0001$; author number: $F = 171.02$, $P = 0.001$; author status × author number: $F = 1.07$, $P = 0.3008$; Figure 1c).

It seems that author status affects citation rates, depending on author number. Bigwig effects are most pronounced for citation rates of papers with less than four authors. Therefore, lower profile authors should either try to have few collab-

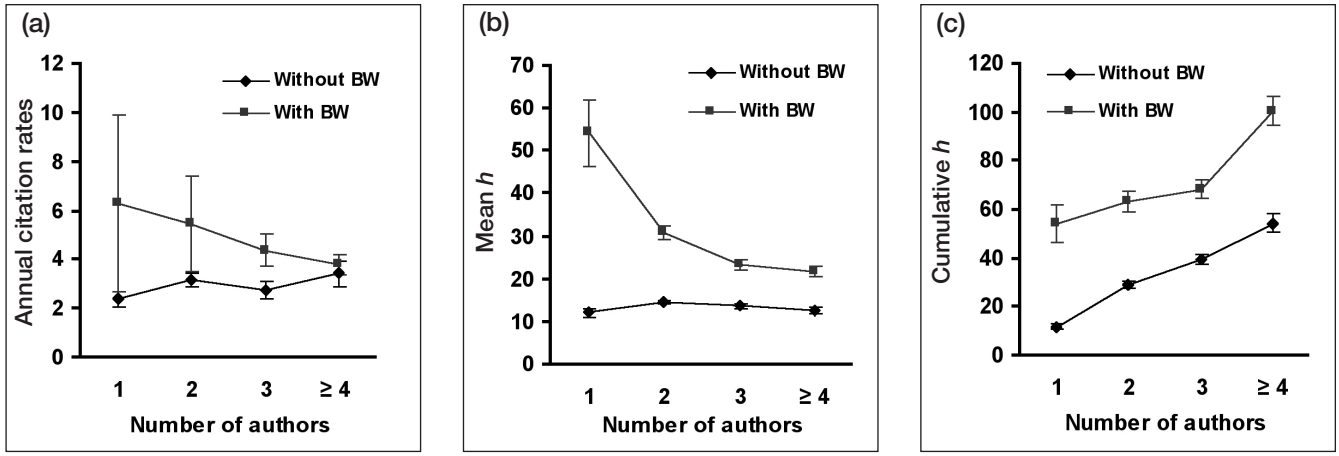

Figure 1. *The relationship between the number of authors and (a) citation rates, (b) mean* h*, and (c) cumulative* h *of papers including and excluding a bigwig (BW). Means ± standard errors are presented in the panels.*

orators, including a bigwig, or many lower profile collaborators. To guarantee their impact, bigwigs, in turn, should publish alone or only with one or two authors.

Roosa Leimu[1*], Christopher J Lortie[2], Lonnie Aarssen[3], Amber E Budden[4], Julia Koricheva[5], and Tom Tregenza[6]

[1]Section of Ecology, University of Turku, Turku, Finland (roosa.leimu@utu.fi); [2]Department of Biology, York University, Toronto, Canada; [3]Department of Biology, Queens University, Kingston, Canada; [4]National Center for Ecological Analysis and Synthesis (NCEAS), Santa Barbara, CA; [5]School of Biological Sciences, Royal Holloway University of London, Surrey, UK; [6]Centre for Ecology and Conservation, University of Exeter, Penryn, UK

Hirsch JE. 2005. An index to quantify an individual's scientific research output. *P Natl Acad Sci USA* **102**: 16569–72.

Leimu R and Koricheva J. 2005a. What determines the citation frequency of ecological papers? *Trends Ecol Evol* **20**: 28–32.

Leimu R and Koricheva J. 2005b. Does scientific collaboration increase the impact of ecological articles? *BioScience* **55**: 438–43.

Tregenza T. 2002. Gender bias in the refereeing process? *Trends Ecol Evol* **17**: 349–50.