Is ecology now a collaborative discipline? A reply to Fitter

In the February 1999 *Bulletin*, Alastair Fitter dealt with the phenomenon of increasing number of authors in ecology papers. He suggests that ecologists adopt team work to do useful and multidisciplinary ecology by tackling difficult problems, to promote the progress and scope of the discipline. We agree basically with Fitter, as collaboration is necessary to deal with certain questions. However, we do not believe that it may be a general explanation of research grouping.

If Fitter’s arguments are right, we would expect that researchers produce ‘better’ papers working in larger groups than in smaller ones. We tested this hypothesis by randomly selecting researchers from *Journal of Animal Ecology*, and considering their publications in their most productive five year interval between 1985 and 1995. For each article, we recorded the number of authors and impact factor of journal (IF), assuming that IF is an indicator of research quality. Spearman's correlation method was used to analyse the association between these variables for each researcher. The average of correlation coefficients was 0.01 ± 0.39 SD, which does not differ significantly from zero (t = 0.09; n = 20; p > 0.93). This suggests that collaboration does not necessarily improve scientific quality of papers, unless IF is not as good indicator of quality as presumed (as suggested by Costello in a Letter to the Editor in the same *Bulletin* issue).

However, collaboration could still be increasing scientific production. To test this, we examined the relationship between team size and number of papers published in Scientific Citation Index (SCI) journals. Although the relationship between those variables seems to have an exponential upper limit (Figure 1), a power regression analysis showed that, on average, scientific production does not increase above the expected proportionality
according to number of authors (because the regression coefficient was 0.9± 0.3 SE, not significantly different from one).

Fitter’s arguments seem reasonable. However, our results suggest that benefits other than scientific progress may be operating. Increasing number of authors is also reported in other disciplines, but the explanations given are diverse. Garfield (1995, *Scientist* 9: 13), for example, emphasizes that the pressure to ‘publish or perish’ is a fact of present life in the research community, as one’s publication record has a significant impact on tenure, promotions, funding, awards and honours. This pressure may result in ‘author inflation’. In fact, editors of several top journals try to stop this problem by defining basic criteria for awarding ethical authorships.

At the same time that authorship has increased, ecology - as well as other scientific disciplines - has attracted more and more students, multiplying the number of researchers, and intensifying competence to obtain prestige and tenure. As shown in our analyses, publication performance depends on team size. Thus, those authors in the largest teams attained the highest rates of publication. At the individual level, the reward of grouping would occur when personal scientific work is evaluated by strict bibliometric measures, without taking into account team size. For example, in a competition for tenure in Animal Ecology at the Spanish Council for Scientific Research (CSIC), the final score of candidates was only explained by the number of papers in SCI journals (R-squared = 0.65; F = 22.7; df = 1, 12; p < 0.0005). No other variables (mean impact factor (IF), order of authors, papers per author) were significant. We also found that number of SCI papers of candidates depended upon the size of their research team (R-squared = 0.55; F = 15.6; df = 1, 12; p < 0.002). This means that those who sign on large teams have a good chance to obtain a permanent position. Therefore we should be more realistic, and consider that social and political trends may also be forcing many ecologists to adopt team work without any or with a small benefit to the discipline.

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![Figure 1](image-url)