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Too Many Biologists: A Reply from Adamo

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intended to deter forest managers from cautiously exploring AM as a tool for climate change adaptation. In fact, as the climate changes, plantations regenerated using local seed sources are also expected to experience suboptimal growing conditions and changes in the frequency and magnitude of extreme events such as droughts and heat waves; thus, risks exist in the absence of AM, as well. The issues raised here underline the importance of managing risks at reforestation sites through recognized strategies such as employing multiple seed sources, using established field trials to guide seed movements, and exercising caution and humility when calculating migration distances.

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Gender Bias Also Contributes to the Attrition of Women in Science

I read with interest the recent article by Adamo (2013). The underrepresentation of women across many subfields of academic science and medicine is a pressing issue, with serious implications for the future of our national competitiveness and scientific progress. Therefore, I was pleased to see this article exploring potential factors contributing to the attrition of women within the biological sciences and attempting to draw valuable lessons from the comparatively successful retention efforts in medical fields. However, I was struck by the author's omission of a discussion of gender bias as a potential factor contributing to the scarcity of women.

Recent research conducted by me and an interdisciplinary team of coauthors (Moss-Racusin et al. 2012) builds on a large body of social science work and demonstrates that both male and female science faculty members exhibit robust, measurable gender biases benefiting their male students. More specifically, biology, chemistry, and physics faculty members at research-intensive universities across the United States judged a female student to be less competent, less hirable, and less deserving of mentoring than an identical male student and also paid the female student almost $4000 per year less for a lab manager position. These data suggest that, in addition to the workload and motherhood factors discussed by Adamo, subtle gender biases favoring men may contribute to the gender disparity within science fields.

Indeed, gender bias may play a direct role in driving women out of science (e.g., if they encounter an obviously biased professor) but could also be playing a more subtle role (e.g., if women's motivation and enthusiasm for science are undercut by inadequate mentoring, unfair pay, and downgraded evaluations of their competence). Therefore, although I wholeheartedly agree that the scientific community should work to identify and interrupt the processes that undermine women's full participation in science, I would argue that gender bias should be considered as a potential cause for the loss of women in science, along with the other variables that Adamo considered.

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I am in complete agreement with Moss-Racusin that gender bias remains a barrier to women's participation in science. This problem was nicely demonstrated in her and her colleagues' paper (Moss-Racusin et al. 2012) and has also been shown previously (e.g., Wennerås and Wold 1997). My article was not meant to be an exhaustive survey of the various factors that impede women scientists. I wanted to focus on one critical issue that I think has been neglected—that is, that the oversupply

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of biologists disproportionately disadvantages women. It is this pressure that gives gender bias much of its bite. When competition is fierce, bias can be lethal.

As biologists, we know the power of the comparative approach. In this article, I was searching for the differences between medicine and science that might explain medicine's greater success at recruiting and retaining women. Women in medicine must also contend with gender bias (e.g., BMA 2004); this bias negatively affects the career trajectory of women physicians (Gartke and Dollin 2010). But it has not prevented the continued increase in the proportion of women in medicine (CMA 2010). To emulate medicine's success in attracting and retaining women, we will need to increase job security for trainees and make the competition for entry into our profession occur earlier in training. I believe that these are important features that help medicine recruit an increasing number of women.

Part of my motivation for writing this article was that our current system rewards the overproduction of biologists. For example, in the Canadian system, the Natural Sciences and Engineering Research Council of Canada awards one-third of an applicant's score for training students. No one would suggest that gender bias should be continued, but we seem unable or unwilling to discuss how our overproduction of biologists may reduce the participation of women in science. I hope the article might start this discussion.

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