An academia beyond quantity: a reply to Loyola *et al.* and Halme *et al.*

Joern Fischer[1], Euan G. Ritchie[2], and Jan Hanspach[1]

[1] Faculty of Sustainability, Leuphana University Lüeneburg, Scharnhorststrasse 1, 21335 Lüeneburg, Germany
[2] Deakin University, School of Life and Environmental Sciences, 221 Burwood Hwy, Burwood, VIC 3125, Australia

We recently criticised academia's obsession with quantity in papers, citations, and grant income. An overly strong focus on such metrics has produced ever busier academics, shorter and less comprehensive papers, less time for nuanced discussion, and less local, empirical research – and, ultimately, has eroded time for creativity and reflection [1]. Loyola *et al.* [2] and Halme *et al.* [3] challenged some of our assertions and contributed useful thoughts to advance this discussion. Loyola *et al.* argued that the very metrics we criticised had in fact helped to foster better quality research and new research networks in Brazil. We concur that it is plausible that, depending on their histories, some research settings will benefit from the application of quantity-related metrics, whereas other settings will suffer. Central and South America, and parts of Eastern Europe and Asia, have a relatively short history of publishing internationally. In such settings, providing incentives to face international peer review very likely will improve the quality of science and lead to new collaborations. By contrast, we maintain that, in many established research settings (e.g., the EU, North America, Australia), many once sensible incentives are being over-applied and thereby have become counterproductive. Halme *et al.* encapsulated well the problems of many senior academics (and, we add, those in tenure-track positions): not enough time to go into the field or the laboratory, talk to research students, or even adequately stay on top of an exponentially growing literature. We welcome their suggestions to move from the diagnosis of our cultural disease to its treatment. Whereas we suggested making changes in our immediate environment, Halme *et al.* argued we should instead lobby for policy changes. We do not fully agree with this argument, partly because it provides too many excuses for individual academics to simply 'blame the system' without doing anything about it. Arguably then, a mixture is needed of lobbying for top-down changes and bottom-up initiatives that encourage leadership and change from within our immediate working environments.

Here, we provide a tentative roadmap towards an academia beyond quantity (Box 1). First, a definition is needed of what kind of working environment should be fostered. Where current incentives fail to produce such an environment, top-down structural impediments need to be removed. Key structural changes relate to improved flexibility and a stronger focus on fostering a culture of creativity and communication, rather than over-relying

> **Box 1. Roadmap towards an academia beyond quantity**
>
> In some academic settings, the *bona fide* intention of rewarding productivity has created an unhelpful culture characterised by high academic throughput. Such settings need be challenged both at a structural level (top down) and at an individual level (bottom up). An ideal academic environment will exhibit several of the following properties:
>
> (i) a culture that fosters insight, creativity and reflection;
> (ii) time and space for in-depth discussion of important issues (including discussion that deeply questions the status quo rather than being satisfied with incremental improvements);
> (iii) management that values and facilitates a variety of relevant strengths (e.g., in teaching, administration, research, outreach);
> (iv) senior academics who are connected to the everyday realities of their subject areas through work in the field or laboratory and through close interactions with junior researchers;
> (v) leaders and mentors who impress through their wisdom rather than by working long hours or having ever-higher intellectual throughput; and
> (vi) an environment flexible and supportive enough to encourage bright young people, of all genders [7] and backgrounds, into academia.
>
> *Necessary structural adjustments (top down)*
> (i) Science policy makers, funding bodies, university administrators, and heads of department must look beyond simplistic metrics that supposedly indicate an academic's value or the value of entire universities [8] – considering instead how to foster a creative and supportive scholarly culture.
> (ii) The systematic over-commitment of academics must be avoided; for example, by negotiating individual time budgets split across research, teaching, and administration (noting trade-offs between these as well as meaningful total volumes of commitment).
> (iii) Administrative hurdles inhibiting research must be reduced to a minimum, following existing funding schemes rewarding research excellence.
> (iv) Feedback mechanisms should be introduced that specifically target quality; for example, in research student supervision.
> (v) Negative effects of working long hours, especially on families and mental health, must be recognised.
> (vi) An environment must be created that recognises *pro rata* achievements and enables a flexible choice of working hours [7].
>
> *What individuals can do to foster change (bottom up)*
> (i) Be proactive in your immediate environment and demand or instigate changes where necessary – rather than slavishly following incentive structures.
> (ii) Recognise that everybody's time budgets are limited and say no to some 'opportunities' (at times, despite structural incentives to say yes).
> (iii) Take time for important life content beyond academia (e.g., family, friends, exercise, cultural interests).
> (iv) Consider whether growing your research team will in fact be conducive to research quality.
> (v) If you do grow your team (or have a large team already), ensure mechanisms are in place to maintain high-quality student supervision.

Corresponding author: Fischer, J. (joern.fischer@uni.leuphana.de).

(vi) Encourage senior academics to spend time in the field or laboratory.
(vii) Prioritise your research not only by what is topical (and potentially publishable in top-tier journals), but also by what you deem as truly important.
(viii) Create times and spaces for informal exchange within regular work hours (e.g., via morning tea breaks, coffee lounges).

We acknowledge that some successful research teams and institutions are already implementing many of these points.

on narrowly defined indicators [4]. At the same time, individual academics can start the process of change within their workplaces, rather than blindly running along on an ever-faster treadmill to intellectual nowhere. Even simple steps can be useful, including abolishing unnecessary committees, dividing teaching responsibilities smartly and flexibly, and creating times and spaces for informal exchange. On its own, none of the solutions we propose (Box 1) is a panacea, and neither our assessment of the problem nor of its solutions is complete. Rather, we hope this discussion will continue to spread into institutions, blogs, and science policy networks.

In summary, we encourage reflection on how modern academics should best invest their energy [4,5]. Where incentive structures fail to deliver conditions that most academics believe are needed to best stimulate insights, these structures must be challenged and changed, from the scale of individual research groups to supra-national science policy. Frodeman [5] recently questioned the sustainability of an exponentially growing knowledge industry. He suggested a culture of knowledge production for the sake of it could in fact hamper our capacity for true insight, rather than foster it – implying reflection is needed on why we need to know more, and what it is that we need to know more about [4]. Curiously, ancient philosophers such as

Aristotle valued still contemplation as the highest level of activity (and productivity) possible, whereas today, much more visible (but less productive) behaviours are associated with the notion of 'activity' [4,6]. In many established settings, academia needs to take a step backwards and once again value behaviours associated with communication and contemplation, rather than be obsessed with measures of intellectual throughput.

References
1 Fischer, J. *et al.* (2012) Academia's obsession with quantity. *Trends Ecol. Evol.* 27, 473–474
2 Loyola, R.D. *et al.* (2012) Obsession with quantity: a view from the south. *Trends Ecol. Evol.* 27, 585
3 Halme, P. *et al.* (2012) Solutions to replace quantity with thinking in science. *Trends Ecol. Evol.* 27, 586
4 Loehle, C. (1990) A guide to increased creativity in research - inspiration or perspiration? *Bioscience* 40, 123–129
5 Frodeman, R. (2011) Interdisciplinary research and academic sustainability: managing knowledge in an age of accountability. *Environ. Conserv.* 38, 105–112
6 Fromm, E. (1976) *To Have or to Be?* Harper & Row
7 O'Brien, K.R. and Hapgood, K.P. (2012) The academic jungle: ecosystem modelling reveals why women are driven out of research. *Oikos* 121, 999–1004
8 Butler, D.W. (2003) Explaining Australia's increased share of ISI publications—the effects of a funding formula based on publication counts. *Res. Policy* 32, 143–155

Metacommunities and symbiosis: hosts of challenges

Stavros D. Veresoglou[*], Tancredi Caruso[*], and Matthias C. Rillig

Freie Universität Berlin, Institut für Biologie, Plant Ecology, 14195 Berlin, Germany

A landmark breakthrough in community ecology was the realization that the assumption of continuous landscapes in nature could result in biased estimates of community dynamics, which can only be corrected through consideration of metacommunity theory [1]. Mihaljevic [2] recently highlighted the potential of applying metacommunity theory to the study of symbiotic associations. Although we agree with Mihaljevic [2] on the potential of this approach, considerable further development of the metacommunity concept is required before it can be applied to communities of symbionts.

This limitation exists because existing metacommunity theory falls short of describing the dynamic nature of

symbiotic systems: islands are less passive than hosts, as island colonizers have a considerably more restricted potential to modify features of their island. This implies that the identity of endosymbionts could modify host fitness and, consequently, host carrying capacity. Moreover, functional differences can exist among the endosymbionts, resulting either in complementary effects on host fitness [3–5] or differences in the extent to which each endosymbiont modifies host fitness (e.g. two endoparasites that are exceptionally deleterious to their host will compete more strongly with each other even if their direct interaction is weak). Furthermore, especially for mutualistic interactions, the interaction strength between endoparasites and their host often masks any interactions linking the endoparasites (e.g. plants largely determine the identity of their arbuscular mycosymbionts [6,7]).

Corresponding author: Veresoglou, S.D. (sveresoglou@zedat.fu-berlin.de).
[*] These two authors contributed equally.