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The Effective Scientist: A Handy Guide to a Successful Scientific Career. By Corey J. A. Bradshaw. Cambridge University Press, 2018. Paperback pp. xiv + 276. Price GBP 17.99 (paperback), 46.99 (hardback), 20.00 (ebook). ISBN 9781316779521.

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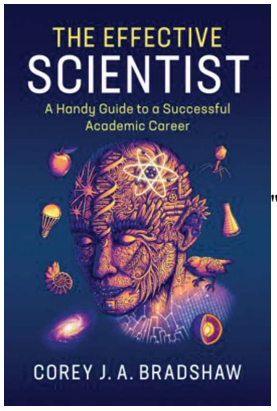
Once one has embarked on a science career the question arises, how can one maximize one's effectiveness? This book by the very accomplished global ecologist Corey Bradshaw is devoted to explaining that. My own book *Skills for a Scientific Life* (Helliwell, 2016) to some degree creates a need to keep my observations in this review of the book by Corey Bradshaw as specific and thereby as objective as possible, but it also shows our joint interest in this topic. I had a similar situation with my recent review of the book *Scientific Leadership* (Niemantsverdriet & Felderhof, 2017; Helliwell, 2018), a topic which again I had covered in parts of my *Skills for a Scientific Life* book. With this new book by Bradshaw on the effectiveness of a scientist I felt a real sense of being kindred spirits with him, by which I mean the two of us are scientists from very different science domains facing quite similar, but not identical, challenges. I greatly enjoyed reading his thoughts and advice on becoming as effective as possible. My attention was drawn to the book because of a review of it in the 3–9 May 2018 issue of the *Times Higher Education Supplement* (*THES*) by Dr Jennifer Rohn (2018). Normally in my book reviews I deliberately do not look at other reviews before I read the book and write my own review. The headline statement extracted by *THES* from Rohn's review was that 'This book offers PhDs sound advice but it skirts the improbability of making it.' Rohn also states that

> what fledgling science trainees really need is a good dose of tough love: a comprehensive and honest description of their chances of success, and support and training opportunities to help them understand and realize the rich array of options outside academia. However established scientists assume and preach that doing the right things, along with luck and much hard work will give trainees a fair shot at the professorial pot of gold.

As my *Skills* book had mentioned that in describing my own transition to academic tenure and *THES* had highlighted my book in their New and Noteworthy section of new books, I wondered if that was Rohn's verdict on my own description. Setting that issue raised by Rohn (2018) aside for the moment, I focus firstly on whether this new book succeeds in its aims. If we look at the Cambridge University Press (CUP) web site for the book it is described as follows:



> What is an effective scientist? One who is successful by quantifiable standards, with many publications, citations, and students supervised? Yes, but there is much more. Truly effective scientists need to have influence beyond academia, usefully applying and marketing their research to non-scientists. This book therefore takes an all-encompassing approach to improving the scientist's career. It begins by focusing on writing and publishing – a scientist's most important weapon in the academic arsenal. Part two covers the numerical and financial aspects of being an effective scientist, and Part three focuses on running a lab effectively. The book concludes by discussing the more entertaining and philosophical aspects of being an effective scientist. Little of this material is taught in university, but developing these skills is vital to maximize the chance of being effective. Written by a scientist for scientists, this

practical and entertaining book is a must-read for every early career-scientist, regardless of specialty.

- Written in an engaging and entertaining style, making the topics easy to digest and remember

- Includes engaging, custom-drawn cartoons illustrating many of the specific topics discussed

- Discusses sensitive issues, such as personality conflicts and stress management, that are of increasing relevance for the modern scientist, but are usually neglected in academic books.

The book's chapters are as follows:

Preface; *What is an 'effective' scientist?*; *Become a great writer*; *Me time*; *Writing a scientific paper*; *Sticky subject of authorship*; *Where and what to publish*; *The publishing battle*; *Reviewing scientific papers*; *Constructive editing*; *Fear not the numbers*; *Keeping track of your data*; *Money*; *Running a lab*; *Making new scientists*; *Human diversity*; *Splitting your time*; *Work–life balance*; *Managing stress*; *Give good talk*; *Getting the most out of conferences*; *Science for the masses*; *Dealing with the media*; *'Useful' science*; *Evidence-based advocacy*; *Trials, tribulations and triumphs*; *References.*

As I read through the well written prose, enjoying the sketches by René Campbell, I often nodded at advice and shared experience from the vantage point of this very experienced scientist, whose background as a global ecologist gave perspectives often different from mine. The section on giving a good job interview talk to leap that major hurdle from the postdoctoral scientist to a permanent position I thought especially valuable. Thus, notwithstanding Rohn's criticism about this aspect of Bradshaw's book, this is very good advice from Bradshaw. Overall, following the advice given in most of these chapters would yield improvements. There would conversely be little to no harm done by the aspirant not implementing the advice properly. (Mentioning the lovely sketches by René Campbell, I must remark that the book front cover is, however, not for the squeamish.)

When I came to the penultimate chapter, *Evidence-based advocacy*, I was disappointed that like the book on *Scientific Leadership* by Niemantsverdriet & Felderhof (2017) there was no text on the different scientific methods. It was clear that in global ecology the predominant method is hypothesis driven, through the several mentions in *The Effective Scientist* of making a hypothesis, gathering data and then making a statistical evaluation of its significance. This is not asking a question like 'What if the speed of light is finite?' as Einstein did, or saying 'let's make a collection' as Darwin did. The chapter *Evidence-based advocacy* was true to the CUP web site description: 'Truly effective scientists need to have influence beyond academia, usefully applying and marketing their research to non-scientists.' This chapter was, then, to be especially important. It introduced the terminology, new to me, that science is not objective but 'reduced subjectivity'. I can imagine that in global ecology one could well meet some rather hostile critics and advocacy from the scientist being interviewed would be the defensive shield. However, I felt very uncomfortable at this chapter's advice, and in particular I felt that a scientist trying to follow this advice would be in serious danger of harming their science career, not optimizing it. In my *Skills for a Scientific Life* book I had wrestled with the Winston Churchill view that 'scientists should be on tap and not on top', to which I reasoned instead as follows:

> It is vital for us as scientists to be better prepared to face ethical questions and how to do this should surely be a mandatory part of the skills training we receive. One thing is for sure, the discussions of the implications of scientific research discoveries will not be for us to define on our own, such discussions must include all constituents of society, and at the least society's elected representatives. Conversely these elected representatives must include scientists in such debates to provide firm contact with the scientific facts.

Furthermore, to press my point now, in such meetings scientists should be voting members, not just there to answer queries and explain the scientific evidence as known facts, be that the statistical significance of data or the consequences of *e.g.* $E = mc^2$ for peace or war.

So, without the chapter *Evidence-based advocacy* I would have recommended the book by Bradshaw, but since it is there I am afraid I cannot. To strive to be as fair as possible to the book, Rohn (2018) did not raise any objections about that particular chapter.

I return now to the Rohn (2018) criticism of Bradshaw's book that it skirts the issue of the improbability of a science PhD making the transition to a permanent scientific post. This is indeed a major concern of the funding agencies, and a previous analysis of the biomedical research environment and lack of a career progression of PhDs or postdocs in the USA is very relevant to this (Alberts *et al.*, 2014). The in-depth study and commentary by Alberts *et al.* (2014) documents the undue proliferation of the number of PhDs and postdocs in biomedical research in the USA and then goes on to make specific recommendations for improvements. These include the need for a predictable budget for a funding agency, such as a five-year commitment of the USA government (rather than an annual approval method); reducing the number of trainee scientists; increasing the salaries of postdocs; and encouraging the briefing of such scientists about alternative careers. Various of these are already covered in the British funding environment. An additional aspect of the Alberts *et al.* (2014) report is the importance of recognizing that the principal investigator (PI) scientists are not just writing machines, of grant proposals and of publications, but PIs should be encouraged/required to continue their own research and the regular updating of their research skills. Indeed, I firmly encouraged such an approach in my *Skills for a Scientific Life* book, not least as the poor grant proposal success rates obviously commend that one does so or abandon various of one's carefully planned pieces of research. Overall, most importantly, whilst we must present our results as well as possible and, yes, we must strive to win funding with the best written proposals, the heart of the skills for a scientific life are

our own practical engagement, or otherwise we become 'solely' a research *manager* rather than a research *scientist*.

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