

How To Be a Better Scientist. By Andrew C. Johnson and John P. Sumpter. Taylor and Francis, 2018. Pp. 248. Price GBP 15.19 ISBN 9781138731295 (paperback), GBP 76.00 ISBN 9781138731219 (hardback), GBP 12.34 ISBN 9781315189079 (ebook).

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The authors of this book are ecologists with ‘60 plus combined years doing science’ (p. 238). Where I quote page numbers these are in my Kindle for iPad copy. I need to declare a possible perceived conflict of interest in that there is some overlap with my own series of *Scientific Life* books, published in the past few years. I hope it is clear from my text below that I have strived to be evidence based in my observations of this book.

Chapters 1 (*What do we mean by science and ‘being a better scientist?’*) and 2 (*What characteristics should I have as a scientist and am I that person?*) are focused on explaining the basic characteristics needed if considering being a scientist as a career. They therefore seem not to fit the book’s title.

In chapter 3, entitled *Understanding the hypothesis*, the book gets into its stride. Postulating several hypotheses that should be falsifiable à la Karl Popper is a very promising way for the reader to learn what science is all about. The authors then draw the reader’s attention by describing research grant proposals, in outline, that did not marshal their hypotheses properly.

Chapter 4, *How do I find my way?*, is about choosing a project and a supervisor and like chapters 1 and 2 is not about being a better scientist but starting out. It explores the choices of types of PhD project and types of supervisor. It sets out advice for the next step after the PhD.

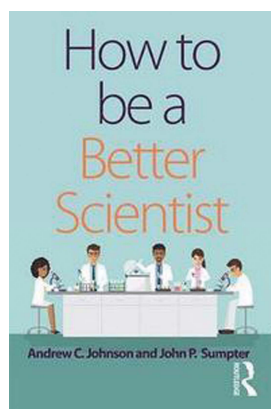
Chapter 5 is *Integrity in science*. This is a wide-ranging chapter with sound guidance. The three references include one that I found too specialized (about bone marrow in the *British Medical Journal*) to be useful. I especially liked the emphasis on data in experiments and how pre-publication peer review of an article with data is far superior to their post-publication peer review. Reference 1 is especially informative in such matters (Allison *et al.*, 2016).

Chapter 6 is *Lack of confidence and the embarrassment factor*. I found this a strange chapter, almost making the reader feel that to not have a lack of confidence would be abnormal. There is surely a spectrum of feelings and beliefs of the newcomer to science. If there is a common feeling I suggest that it would be, simply, being eager to learn.

Chapter 7 is *The basics of doing an experiment*. This starts off well with the core point that an experiment needs to be designed to be as simple as possible and also have proper controls. Unfortunately the chapter tries to illustrate basic experimental design with a highly specific medical experiment. The sections on statistics and data analysis as well as avoiding bias and striving for reproducibility are good. I think, however, that the authors should mention the requirement to archive the data from the experiment, to allow checking of the data that underpin the research.

Chapter 8 is *Time management*. This chapter also gets off to a good start, explaining that making a plan and prioritizing a list are good practice. At p. 102, we are advised ‘explain to a manager that you have not completed a task’. But a student and supervisor relationship, the emphasized context thus far, is not a managee and manager relationship.

Chapter 9 is *Giving a presentation or poster*. The detailed section on talks is a real gem, offering very practical, good advice. The only extra point I would stress is, do not include anything on a slide that you do not mention in your talk. In terms of the structure of the chapter, also including poster presentations seems to me not a good idea. A talk will



highly likely have conclusions, in order to be so selected. A poster will quite likely be ongoing work and not yet have conclusions. Posters also attract poster prize judges, often in quantity, and therefore senior scientists as judges engage with presenters in a level of often considerable detail. Posters are very much worth doing!

Chapter 10 is *Writing a (good) scientific paper*. This chapter makes many good sensible points and sets out some useful guidelines. A point I would like to see discussed in this chapter is that great care is needed with the order of authors, and conventions do vary from field to field.

Chapter 11 is *Writing grant proposals*. The authors make clear (p. 173) that ‘they are focusing on younger scientists . . . seeking their first external grant and not on the strategy to obtain a large multi-centred grant’. It is an excellent chapter packed with good and useful advice. I would only add that new academics may have a chance to attend their institution’s training workshops along with other younger scientists seeking their first research grant. These can be highly informative and also quite sociable.

Chapter 12 is *How to cope with rejection*. As the previous chapter mentioned, 80% or more of proposals get rejected. This chapter covers that and more situations of rejection than grant proposals alone. The authors give good advice such as keep going and do not take it personally. A good work–life balance is essential too (discussed in chapter 14.)

Chapter 13 is *Interacting with the science community through social media*. This chapter covers these platforms in an interesting order: ResearchGate, LinkedIn, Facebook, Twitter, Instagram and personal blogs. The authors ‘took advice from young scientists’ for the content of this chapter. It is a good chapter and clearly advises that social media can be used to very good effect to improve one’s effectiveness: not least Twitter which, with its 240-character limit and maybe a picture or two, has improved standards of conciseness a great deal.

Chapter 14 is *When things are not going well*. Starting with work–life balance and avoiding overwork, the authors progress to consulting welfare officers, then counsellors and on to serious, including clinical, depression. As steps on that spiral I would also emphasize advice such as ‘treat yourself’,

‘explore options to get a good night’s sleep’ and ‘time for that holiday’. A handy quote for all of us to recall, attributed to Einstein, is ‘failure is success in progress’.

Chapter 15 is *How to be a better supervisor*. This chapter seems a change of gear from the focus on the early career scientist but is explained as preparing for the supervisory role. New academics in my university have an extensive training programme culminating in a portfolio summary, which is assessed. At the start of my career it was just an afternoon. This chapter describes the situation of no such training being provided. It immediately makes clear that a PhD student is not a technician and proceeds to give good advice. The chapter moves on very briefly to discuss supervision of postdoctoral scientists.

Chapter 16 is *Wider aspects of science management*. This chapter is a bit difficult to navigate until a few clues identify that it is aimed at someone who is running a department (e.g. p. 231). A clearer distinction could be made in this chapter between the types of science mission and seniority levels of the scientist. I think that the end-of-chapter checklist does not work so well here, e.g. the first check point is ‘avoid micro-management’ but this is its first and only mention.

Chapter 17 is *Final thoughts*. This is a neat summary.

There is an extensive subject index.

Each chapter opens nicely with attractive sketches and ends helpfully with a checklist of points made in the chapter. The writing style is clear. The chapters are short and well structured. They are a pleasure to read. This short book will prove a useful handbook for scientists deepening their experience as well as during project planning and execution. Having been a senior mentor for new academics in a large chemistry department for several years, I think this book would be a good value supplement to our training procedures and documents. I recommend it.

References

- Allison, D. B., Brown, A. W., George, B. J. & Kaiser, K. A. (2016). *Nature*, **530**, 27–29.