

Bad Pharma, Ben Goldacre, Fourth Estate, London, 2013

Ben Goldacre, the author of this book, is a campaigning investigative journalist. He is also a doctor and a scientist. Readers may be familiar with his book *Bad Science* [1] (also reviewed in this series) and his 'Bad Science' column in the Guardian (also available on line) [2]. This book is an attack on the pharmaceutical industry and its fellow travellers in the medical profession, academia, statutory regulatory bodies and government. Readers will make their own judgement on this but its value in a school education context is that the author makes his case based on a forensic and rigorous examination of evidence. His conclusions and suggestions for action are supported by well referenced evidence making a transparent case that is open to examination, contradiction and debate. In that, it is an excellent example for students of good practice in evidence-based science.



“This book is a clear description, for a lay audience, of shortcomings in medicine that have been widely discussed and documented in academic journals for many years. I believe we have a duty to share these problems, especially where we have failed to fix them ourselves; and I believe we need the public’s help to deliver change.”

Ben Goldacre.

In the section on 'Missing Data' the author presents evidence that industry funded drug trials are more likely to produce a positive, flattering result than independently-funded trials. He then goes on to give examples where negative results have been suppressed and where results have been 'cherry-picked' to suit a desired view-point. The inclusion of all the results found in research is a lesson of particular value for students in Advanced Higher Biology Project work who having formulated a hypothesis or question to investigate, often view unexpected results to be of little value or to be from experiments that 'have not worked'. Similarly students often fail to see results in their data other than the ones they expect or wish to see. These are common weaknesses in Advanced Higher Biology Project reports and reading about these issues in advance of doing project work may be helpful. This section of the book also gives a clear description of 'systematic review' of research and the 'meta-analysis' of data found; something which although largely found in evidence-based medicine is also relevant to other areas of scientific research including agricultural field trials (and educational research!). These topics are relevant to the Higher Human Biology Unit *Immunology and Public Health* (clinical trials) and the Higher Biology Unit *Sustainability and Interdependence* (field trials) as well as the Advanced Higher Biology Unit *Investigative Biology* including its Project work.

The section on 'Bad Trials' presents the many different ways in which clinical trials can be fundamentally flawed in both design and analysis. These flaws are not unique to clinical trials and can be found in other areas of scientific research including Advanced Higher Biology investigation project reports. By reading this book before embarking on their Advanced Higher Biology course students should develop an awareness about the need for good experimental design in investigation project work. However teachers should exercise a

degree of sensible and proportionate caution in encouraging students to think critically about their own experimental designs. Advanced Higher students are not expected to produce reports to a standard that would be published in a peer reviewed journal (although after reading this book one may wonder what that standard is!). Teachers should encourage students to critically evaluate their own work without doing it down and afford them the opportunity to be speculative in a guarded way about their conclusions.

The section on marketing describes the long and arduous business of writing a scientific paper and the process of peer review. These topics are relevant to the theory of the *Investigative Biology* Unit of Advanced Higher Biology and to its investigation project. Overall this book is suitable reading for students before they progress to an Advanced Higher Biology course as well as being relevant background reading for the study of clinical trials and field trials in Higher Human Biology and Higher Biology courses. It is also a devastating critique of how the medical establishment has failed us. Perhaps young people, the scientists of tomorrow, should read it. Useful references related to this book are given in the review to Ben Goldacre's other book *Bad Science* and are appended below for the reader's convenience [2-7].

References:

1. *Bad Science*, Ben Goldacre, Fourth Estate, London, 2008.
2. <http://www.badscience.net/> accessed 11 July 2014.
3. <http://www.collins.co.uk/page/Bad+Science> accessed 11 July 2014.
4. <http://www.nhs.uk/conditions/clinical-trials/pages/introduction.aspx> accessed 11 July 2014.
5. <http://www.nhs.uk/News/Pages/NewsIndex.aspx> accessed 11 July 2014.
6. <http://summaries.cochrane.org/> accessed 11 July 2014.
7. *Testing Treatments – Better Research for Better Health Care*, Imogen Evans, Hazel Thornton & Iain Chalmers, Pinter and Martin Ltd, London, 2010. Available at <http://www.testingtreatments.org/> accessed 11 July 2014.