GWAS chapter is a must-read for students today. The final chapter of *Statistical Bioinformatics* highlights the book's greatest strength: the consistent inclusion of statistical programming examples. The statistical programming language R is used throughout the text, and Chapter 13 discusses at length the use of R and its Bioconductor package for bioinformatics applications.

Statistical Bioinformatics is noteworthy for its breadth of coverage and use of descriptive examples. It will find use both as a graduate textbook and as a guide to self-study. Statistics is a large field, and the foundational chapters will help guide students to what they need to know. The remaining chapters introduce topics of relevance to bioinformatics students in such a way that more specialized knowledge can easily be sought.

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Statistics at the Bench: A Step-by-Step Handbook for Biologists. M. Bremer & R. W. Doerge. Cold Spring Harbor Laboratory Press. 2010. 167 pages. ISBN 9780879698577. Price $59 (hardback).

In recent years, there has been an increase in the number of elementary statistical textbooks based on a statistical package such as SAS, Minitab or S-Plus. The idea behind this approach is that the availability of such packages allows computational details to be skimped in order to free the reader to concentrate on interpretation.

Statistics at the Bench, a handbook from Cold Spring Harbor Laboratory Press, is an example of the genre, with Excel (the spreadsheet application from Microsoft) as the chosen program. The authors describe the book as providing 'a quick refresher or a big-picture overview of a statistical procedure', and address the typical reader as the kind of biologist for whom 'it has been a long time (if ever) since you last took a course in mathematics or statistics, or even considered thinking quantitatively about your data'. The motivation for the book is that 'biology is becoming increasingly computational … Large amounts of quantitative information need to be organized, displayed and understood'.

The writing style is light and breezy, designed to reassure the biologist who has a dislike or fear of mathematics. Cartoons illustrate some of the examples, which are varied and relevant for a biological audience. Some examples: Mendel's data on colour and shape of peas, the iron content of spinach, lifespan of English gentry, the number of petals on an *Arabidopsis* plant, the effectiveness of contraception, length of *Drosophila* sperm cells, candidate genes for alcoholism and a BLAST search. Explanations are given verbally as far as possible. Mathematical terminology is basic and kept to a minimum.

Standard topics are covered (descriptive statistics, design of experiments, confidence intervals, hypothesis testing, regression and ANOVA), as well as some topics not usually included in a text at this level (classification, clustering, principal components, microarray data analysis, maximum likelihood and Bayesian statistics). A typical chapter introduces a topic by describing the aim of the analysis and the type of data to which it applies. Parameter estimation and hypothesis testing are described briefly (generally without detail or formulas), and instructions given for analysis in Excel. A small worked example is used to illustrate the technique. The reader is shown how to examine diagnostic plots and check the assumptions of the model.

This approach works reasonably well for the simpler applications, but breaks down for more complex cases. As the authors explain, 'we chose Excel because it … is widely used by biologists today. This said, we recognize the limitations of Excel and acknowledge that it is not an advanced statistical program. For applications that exceed the scope of this text (and Excel), there are other statistical programs that may be more appropriate'.

The treatment of most topics is rather superficial, but as an introduction for the target audience (biologists with a weak background in statistics) the level is about right. The reader will have to look elsewhere for an in-depth treatment. References given at the end of the book might usefully have included some standard texts, such as Sokal & Rohlf (1995).

The authors describe their aim as 'to assist biologists in becoming fluent and comfortable in the language of quantitative reasoning and to facilitate open and informed communication between the biological and quantitative sciences'. This book represents a small step in that direction.

Reference

Sokal, R. R. & Rohlf, F. J. (1995). *Biometry: the Principles and Practice of Statistics in Biological Research*, 3rd edn. New York: Freeman.

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