

tion and chromatographic separation of the desired protein. Newer developments such as expanded bed affinity chromatography, perfusion affinity chromatography, use of affinity-enabled disks for affinity-based analysis, purification and conversion of biomolecules have been covered in chapters 3, 4 and 5 authored by Lali, Farhner and Blank, and Berruex and Freitag respectively. A lucid description of the use of sugars as affinity ligands is given by Satish and Surolia in chapter 6. General, broad-based application of macroaffinity ligands such as chitosan, Eudragit and alginate in bio-separation is detailed in chapter 7 by Roy and Gupta. Use of cellulose binding domains as affinity tags is illustrated in chapter 8 by Kilburn and colleagues.

Application of two-phase affinity partitioning for the separation of animal cells is elegantly described by Kumar *et al.* in chapter 9. This technique, which employs a polymer with a covalently-linked affinity ligand as a stimuli-responsive soluble-insoluble polymer, is also useful for the purification of soluble molecules as well as subcellular organelles. Reverse phase micellar separations that employ small molecule-protein, protein-protein and antibody-protein affinity interactions form the subject of chapter 10 written by Adachi. Analysis of the kinetics of analyte-receptor interactions in biosensors by fractals is illustrated in the last chapter by Ramakrishnan and Sadana.

Each chapter begins with an appropriate 'Introduction', which provides a number of references to original literature. This is followed by a 'Materials' section that gives a list of chemicals and equipment (and, very often the sources from which they can be obtained) required for the methods described in the chapter. Specific details of the reagent conditions as well as their preparation and storage are also given in most cases. After this, a 'Methods' section gives specific 'stepwise' protocols for various procedures and explanatory notes to clarify some of the points that may not be immediately obvious. A 'Troubleshooting' section gives useful hints to circumvent or solve frequently encountered problems in the various protocols. An 'Applications' section provides specific examples where some of the methods given in the chapter are illustrated. Each chapter ends with a 'Conclusions and Remarks' section, which places the

methods described in the chapter in perspective with respect to the current practices and applications. 'Further Reading' section at the end of the chapter gives the reader additional sources where he/she can find more elaborate coverage of the topic(s) covered in the chapter. These are usually books or monographs. Each chapter also cites a good number of original references from the literature, which can be looked up for further details.

Despite the impressive appearance and many positive points in the way the book has been produced, there are a few minor errors and discrepancies, which could have been avoided/corrected by more careful editorial work. For example, the reference formatting lacks consistency and in some of the chapters, inconsistent within the same chapter. For example, *Journal of Chromatography* was abbreviated as *J of Chromatog* (p. 62, third line from bottom) and as *J Chromatog* (p. 62, last line) in the same page, while the correct abbreviation should have been *J. Chromatogr. Archives of Biochem. Biophysics* (p. 63, reference 12), *Proc. National Acad. Sci. (Biochem)* (p. 63, ref. 10), *J Chrom* (p. 81, reference 3) are some more examples. Clearly, the authors themselves are responsible for these errors, but one expects that the editors should make sure that such errors are corrected. However, notwithstanding these minor errors, this book is well brought out and hopefully, when additional copies are printed, or if another edition of the book is published in the near future, these will be corrected.

Overall, the book provides a topical collection of articles that give specific protocols describing the use of affinity-based methods not only for the separation of proteins and enzymes, but also in applications involving immobilized enzymes as bioconverters. I strongly recommend this book to all institutional libraries that are accessed by practising biochemists as well as to individual scientists who are actively engaged in protein purification.

Reading this book has been a learning experience for me, and I am sure it will be for many other readers as well.

MUSTI J. SWAMY

*School of Chemistry,
University of Hyderabad,
Hyderabad 500 046, India.
e-mail: mjssc@uohyd.ernet.in*

Probability and Its Applications – Probability Models for DNA Sequence Evolution. R. Durrett, Springer Verlag, Tiegartenstraße 17, D-69121 Heidelberg, Germany. 2002. 240 pp. US\$ 69.95.

The abundance of genomic data has been a boon for a wide range of scientists, mathematicians included. This should not be a great surprise: the huge amount of sequence data that is generated is most easily subjected to a first analysis by the methods of statistics. With the sequencing of large numbers of related organisms, comparative genomics, the study of the genomes of related (or unrelated) organisms has become possible. A case in point is the recent assault on malaria, where not only was the parasite *Plasmodium falciparum* sequenced, but also *P. yoelii* which causes malaria in rodents, *Anopheles gambiae*, the mosquito which carries it, and both the human and mouse genome drafts are already available, so that two related parasites, the carrier, and their related victims were all genomically 'bared'. While the benefits of such detailed investigation of organisms at the molecular level can only be reaped slowly, and mainly by the biologist, mathematicians can hope to look at the DNA to answer a different set of questions.

What determines the variability in a bank of DNA sequences? (I was wondering what the collective noun for a set of DNA sequences should be and settled upon bank as evocative of GenBank, the megarepository of all genomic information).

Is it possible to reliably ascertain where the human race actually originated? (The 'out of Africa' hypothesis). How does DNA (the selfish genome!) itself evolve?

Such questions were asked long before there was such a surfeit of sequence data, and reflect the earliest applications of statistics and probability theory to DNA.

Durrett's monograph on Probability models for DNA sequence evolution is an accessible introduction to some of the mathematics and statistics of genome analysis, mainly that part of probability theory that deals with DNA evolution.

Stochastic methods are essential for reconstructing evolutionary history. The population that can be observed today is

a product of the process of natural selection which relies on elements of chance. The earliest model which dealt with recreating genealogical history, the Wright-Fisher model and the coalescent, which helps to estimate the genealogical time, are dealt with in considerable detail in chapter 1 of the book. Chapter 2 deals mainly with the effect of varying population size. One interesting problem discussed here in some detail is the analysis of the so-called control regions of human mitochondrial DNA by Cann, Stoneking and Wilson in 1987. More recent studies by Gyllensten and coworkers published a couple of years ago in *Nature* have confirmed this with more extensive data, but Durrett's analysis helps to understand the route by which the meagre data can be coaxed to give conclusions with a high level of statistical significance.

Chapters 3 and 4 are, respectively, on probabilistic analysis of natural selection and statistical tests to determine (as there must be) departures from neutral selection. The chapter on genome rearrangement, the final in the book presents material which is not easily found elsewhere. In the course of evolution, genomes have expanded by duplication (perhaps repeatedly), by inclusion, by large scale modifications. Inversions, where the entire ordering of genes in related organisms has been altered, are common: we may share the majority of our genes with our closest relatives, the bonobo, and the genes themselves may be nearly identical, but the details, the organization of the genes on the genome, is very different and that makes all the difference – so to speak. Cabbage and turnip, *Arabidopsis* and tomato, cytomegalovirus and the Epstein Barr virus, all provide instances of genomic inversions and translocations. Durrett describes the methods used to determine genomic distances and the derived phylogeny.

As Durrett says in his preface, he wrote the book in order to teach himself about genetics. This is both the book's strength and its chief weakness. Durrett writes for himself and for someone of comparable background. Although it does take a fair amount of effort for the non-expert, the advantage of the style of presentation is that many of the intervening steps are worked out. The fact that the author has been careful in the mathematics also results in a number of mistakes in

sources being pointed out. To my mind, though, not enough discrimination was shown in what is presented: sometimes one cannot see the woods for the trees. A large number of examples are worked out and a lot of primary source material is cited, but (again to my mind) the central issues are not very clearly dealt with, so that one can come away after plodding through a chapter or two, not entirely sure as to what one has learned.

This book would not be easy to use as a text and indeed is not meant to be one. As a supplementary text though, this would provide adequate additional material to anyone who wishes to undertake a serious quantitative analysis of genomic and genetic information.

R. RAMASWAMY

*School of Physical Sciences,
Jawaharlal Nehru University,
New Delhi 110 087, India
e-mail: rama@vsnl.com*

RSSDI Textbook of Diabetes Mellitus. M. M. S. Ahuja, B. B. Tripathy, Sam G. P. Moses, H. B. Chandalia, A. K. Das, P. V. Rao and S. V. Madhu (eds). Research Society for the Study of Diabetes in India, Nizam's Institute of Medical Sciences, Hyderabad 500 082. 2002. 880 pp. Price: Rs 1200.

Diabetology has emerged as a major speciality in the practice of both general medicine and endocrinology. Recently in India, several centres have adopted diabetes as a single disease speciality to provide total diabetes care and treatment starting from the prediabetes to micro and macrovascular diabetic complications. The idea of compiling a textbook on diabetes mellitus was the distant dream of late M. M. S. Ahuja and other Indian diabetologists, who have pioneered in setting up the Research Society for the Study of Diabetes in India (RSSDI), a unique national forum in India. Although there exist a number of exclusive books on diabetes in the global scene, there are few in India reflecting local problems pertaining to our country.

This publication was planned keeping this special objective in view. Based on four decades of national studies, it has been explicitly shown that problems associated with diabetes in India are in several respects distinct from those in the West. Although attempts to cover the special features of diabetes among diverse ethnic groups have been addressed in recent editions of *International Textbook of Diabetes Mellitus*, an indigenous comprehensive treatise was long overdue to cater to the needs of the burgeoning number of medical practitioners/researchers dealing with diabetes in this country and as well as other Third World countries.

While the contributions of India in the field of diabetes clinical and epidemiological studies have been tremendous, only a small number of these works are published or abstracted in the world literature and therefore much of it go unnoticed. The *RSSDI Textbook on Diabetes Mellitus* addresses this problem as several of its chapters deal with data generated in India. More scope has been provided in this book for exposition of areas where Indian investigators have contributed valuable original ideas such as importance of high carbohydrate diet, use of insulin and sulfonylurea in combination, application of yoga in the management of diabetes, MODY (Maturity Onset Diabetes in Young) and FCPD (Fibro-Calculous Pancreatic Diabetes), Malnutrition related diabetes, lean Type 2 diabetes as well as studies of the epidemiology of diabetes in various social classes. The book depicts an adventurous journey starting with the preface on landmarks in the history of diabetes to the final chapter describing the future directions in diabetes care and research. Introductory chapters on intermediary metabolism and insulin biosynthesis and secretion appear as backbones for the textbook. The book represents, in the judgement of its authors and editors, a compilation and assessment of the most valid, accurate and useful data on diabetes and its complications in India.

This book is also designed to target the requirements of family physician, academicians, clinical researchers and diabetes-oriented professionals at large. Individual chapters are grouped into sections dealing with historical aspects, biochemical basis, pathogenesis, genet-