## Fundamental Toxicology

*J. H. Duffus, H. G. J. Worth, eds. Cambridge: Royal Society of Chemistry, 2006: 490(plus xxvi)pp. ISBN 0 854046143 (Hardback). £39.95.*

By chance I had been asked to review John Timbrell's book *The Poison Paradox* (OUP, 2005) when *Fundamental Toxicology* arrived in the post. Both have essentially the same aim – an explanation of the science of toxicology to put synthetic and naturally-occurring chemicals in perspective as regards toxicity and safe use. Timbrell's book, although a tour-de-force, is aimed at the general public and, in my opinion, struggles to make its point because so much chemical knowledge is needed to make sense of the information presented. On the other hand, the RSC publication has the advantages of a defined starting point and separate authors for each of its 25 chapters, and I think largely succeeds in presenting a coherent piece of work.

*Fundamental Toxicology for Chemists* was first published in 1996 with the aim of helping to introduce toxicology into chemistry curricula. According to the IUPAC website, nearly 3000 copies were sold. This second edition has grown by a third, thanks to the revision of the original material and the inclusion of four new chapters: Introduction to Toxicogenomics, Pathways and Behaviour of Chemicals in the Environment, Toxicology in the Clinical Laboratory, and Pharmaceutical Toxicology. Strangely, however, there is considerable overlap in these latter two chapters, which are by the same author.

A glossary of toxicological terms takes up 94 pages and is a useful feature of the book (I remember helping with an early version of this many years ago), as are lists of abbreviations and acronyms of toxicological terms, and of names of international bodies and legislation. The index (28 pages) is fairly detailed. Overall, the presentation is good, although the chemical structures on pages 178 and 322 (dextropropoxyphene is wrong) would have earned me a poor grading in my A-level chemistry class – it would have been easy to redraw them using a modern package.

In conclusion, this book provides a good general introduction to toxicology and I feel confident that it will live up to the standard set by the first edition. The availability of the web resource is a particularly useful feature and the price is reasonable for a hardback volume. I wish it well. □

**R. Flannagan**

## Magnetic Resonance Imaging

*Methods and Biological Applications. P. V. Prassad, ed. Humana Press: New Jersey, 2006: 464pp. ISBN: 1 58829 397 1. £ 79.50.*

This book is from the series Methods in Molecular Medicine and is, as the author states, designed to introduce magnetic resonance imaging (MRI) to biological scientists. The book is divided into five sections. The first section (Introduction) comprises two chapters. Chapter one is a clear introduction to the principles of MRI and magnetic resonance spectroscopy and offers a good grounding in the subject. Chapter two discusses the issues of scaling down MR to the level of single cells in the MR microscopy.

The other four sections are entitled Anatomy, Physiology, Pathophysiology and Novel Contrast Agents. The chapters in the Anatomy section consider *in utero* MRI, mouse phenotyping and brain development. The Physiology section has chapters that consider functional magnetic resonance imaging (fMRI), perfusion imaging and MR spectroscopy. The chapter on fMRI also considers the pros and cons of using a human whole body scanner instead of a dedicated small animal scanner.

The Pathophysiology chapters consider various techniques that can be used to investigate brain disease and tumour physiology. There is also a chapter on how MR techniques could be used in preclinical drug development.

Some of the chapters give details of the specific techniques used in imaging of the animals. Other chapters are more of a review of the topic. All chapters have extensive reference lists. The illustrations in the text are also included on the companion CD.

This book demonstrates the many ways in which research in this area is moving forward and indicates how some of the research is moving towards clinical applications. □

**M. Heath**

## Transfusion-Free Medicine and Surgery

*N. Jabbour, ed. Oxford: Blackwell, 2005: 300pp. ISBN 1 4051 2159 9. £45.*

As a transfusion scientist of 25 years' standing, my intuitive urge on receiving this book was to take a defensive view. However, I was determined to read it with an open mind, and hence commenced a journey of enlightenment! The suggested reader list includes not only surgical team personnel, but practising haematologists and transfusion specialists. However, although there are topics of particular interest to the biomedical scientist, such as the 'quest for artificial blood', the thrust of the text is directed at persuading surgeons in particular to adopt, at least in part, some of the presented alternative strategies to minimise or eliminate the use of blood and blood products in surgical medicine.

The book is edited by one of the most distinguished pioneers in the field of transfusion-free medical programmes. Each chapter is written by either individuals or by teams of medical specialists. The preface is essential reading, rather than something to skip over, and introduces the reader to the book's purpose in promoting the principles of bloodless medicine. However, not all contributors are fully on board, as one author concludes that for the foreseeable future "transfusion of blood components will remain a cornerstone of surgical treatment".

The text reads very easily, providing a satisfactory amount of detail at a level understandable to the non-specialist. Effective use of title subsections means that the reader can quickly map the path being followed. The breadth of subjects covered seems unexpectedly diverse, ranging from practical topics such as administrative issues related to transfusion-free medicine to current views on the coagulation system (which was worryingly out of step with current thinking on the involvement of the 'intrinsic pathway'). Topics are generally well referenced and reported conveniently at the end of the chapter. However these are not always the most topical, with some chapters

only occasionally citing publications from the last five years.

The sequence of chapters also appears somewhat illogical, with theory-based topics being sandwiched between pre-operative, intra-operative and post-operative issues relating to transfusion-free surgery. Indeed, the most persuasive text, which brings together much of the evidence to support a transfusion-free approach, is buried towards the end of the book in chapter nine, rather than being located in a more influential position.

Recognising its rather controversial theme, the book sets out to provide the substance to generate ethical and legal debate on this delicate but increasingly important issue. The origins of transfusion-free medicine are stated, being sourced in the religious objections of the large communities of Jehovah's Witnesses on American soil. However, the editor suggests that today's problem lies in the liberal use of blood products, and endeavours to argue the virtues of adopting an alternative approach by avoiding a resource that can have serious health issues. Indeed, the potential adverse effects of transfusion runs as an ultimately rather tiresome thread throughout the book.

What of the content? Overall, topics seem to be presented independently rather than as a whole. Themes, such as the unresolved debate on suitable transfusion triggers, are often repeated in a number of chapters, perhaps suggesting the discipline does not warrant a book of 300 pages. Indeed, the use of erythropoietin to stimulate erythropoiesis seems to feature endlessly, albeit from slightly different perspectives.

Nonetheless, some interesting strategies are exposed. These include a 'restricted diagnostic phlebotomy', the application of acute normovolaemic haemodilution, artificially controlled hypotension, and the more familiar deliberate induction of mild hypothermia. In addition, reviews of current research present some unexpected findings, such as that 50% of all patients giving autologous blood are anaemic at the time of surgery and thus require supplementary allogeneic transfusion.

Early chapters discuss legal and administrative issues that relate to the provision of blood-free medicine and surgery, including ethical questions posed by the legal rights of patients to refuse blood transfusion and the surgeon's dilemma to respect those rights. In addition, pre-operative clinical perspectives of blood-free medicine and surgery are explored.

Subsequent chapters continue the surgical theme, including, among more obvious elements, clinical strategies to minimise oxygen consumption during surgery and a look at the special perspective of neonatal and paediatric surgical cases. In addition, the enormous cost implication of blood donation is presented and the long quest for effective blood substitutes is reviewed.

The final chapter consists of a rather anticlimactic list of multiple-choice questions on the basic principles of bloodless medicine and surgery, strangely lacking an introduction or any instructions.

Perhaps the biggest disappointment for UK readers is that the book reflects solely the current US healthcare environment. Although agreeing that our colleagues across the water are leaders in the field, it is difficult to equate the needs of a similar approach elsewhere. Perhaps this aspect could have been explored further to highlight the relevance to non-US readers.

Did I complete my journey of enlightenment? Yes, at least in part. Despite some initial reservations, overall I found that this was an interesting and user-friendly manuscript from an authoritative voice in the US forum on transfusion-free medicine and surgery. The heavy clinical orientation means that, while providing valuable information of the clinical need, effects, conservation and physiology of transfusion practice in the surgical patient, this book is an interesting rather than an essential read for the biomedical scientist. However, it did provide an informed and persuasive argument to promote the blood-free approach, improving patient safety and conserving the dwindling blood supply for the most needy cases. Although only one side of the argument was effectively represented, I certainly now feel more fully informed about a scientific and clinical field that is likely to increase universally in importance and application. □

**P. Watson**

## Anti-Tuberculosis Drug Resistance in the World – Report No. 3

*World Health Organization, 2004: 229pp. ISBN 92 4 156285 4. £30.*

The World Health Organization (WHO) famously announced in 1993 that the 'Great White Plague' had returned, alerting the world to a global problem that had never really gone away. In the following year the WHO/IDA TLD launched the Global Project on Anti-Tuberculosis Drug Resistance Surveillance. This is the third of the project reports; previous reports were published in 1997 and 2001.

At a first glance, the report can look somewhat daunting as it appears to be full of tables of results; however, it is well worth exploring, as the clear structure soon dispels this myth. It is written in the form of a good project report: summary, introduction, background, materials and methods, comprehensive results and excellent discussion. The whole format is very user-friendly, well described and the country-by-country statistics for single and multidrug resistance are clearly presented and easy to interpret.

Data were collected from 77 settings worldwide, which is almost a three-fold increase since the first report, and now represents 39% of the global total of smear-positive cases. One of the important aspects of this study is the inclusion of patients who had undergone previous treatment, chronic patients who have a history of failed treatment and relapses (up to 40% of some populations of smear-positive patients).

Inclusion of the resistance patterns for both new and chronic patients provides a much more accurate method for fingerprinting the disease via treatment strategies and monitoring resistance patterns. The data also provide evidence for the effectiveness of DOTS (directly observed treatment, internationally adopted strategy to control TB) and DOTS-plus (for multidrug-resistant TB) worldwide.

The importance of the laboratory in the diagnosis and monitoring of resistance is also highlighted. Improved laboratory surveillance is needed, particularly in areas of the world where knowledge of resistance patterns is limited. Since the start of the project, a network of 20 supranational laboratories has been established to ensure consistency and

accuracy for the surveillance programme via the distribution of quality assurance specimens to every laboratory involved.

This report expands our knowledge of the global patterns of resistance to antituberculosis drugs and gives an invaluable insight into the efficiency of past and current treatment strategies and trends for the future. I will use it as an extensive database of knowledge to inform lectures in the subject area, but I would recommend it as a valuable reference document for a variety of audiences: epidemiologists, microbiologists, clinicians, pharmaceutical companies and government organisations involved in strategy development. □

**M. Wilkinson**

## Breast Cancer Research Protocols

*S. A. Brooks, A. Harris, eds. Humana Press, 2006: 517pp. ISBN 1 58829 191 X. $135.*

This book is not what I thought it was going to be; rather than a book surveying current knowledge and outlining the areas and protocols needed to advance breast cancer research, it is about the techniques used in the preparation and analysis of cells and tissues. As such, and certainly with respect to cell and tissue preparation, they are applicable to a range of other sites in addition to the breast. There are even details of the equipment and accommodation resources that might be needed to carry out various types of tissue preparation; for example, in setting up a basic histology laboratory.

In some respects, the book set me in mind of that stalwart of yesteryear *An Introduction to Medical Laboratory Technology* by Baker, Silverstein and Luckcock, with editions dating from 1955 (London: Butterworth, 1955). Not, you understand, that this reviewer was practising at the time of the original edition. Of course, the original authors would not recognise the techniques for analysis of genes and gene expression, or of tumour-derived proteins and antigens, but they would feel quite at home reading how to process tissues for paraffin-wax sectioning and subsequent staining with haematoxylin and eosin.

Like all 'recipe' books, it is not the solution to obtaining mastery of a particular technique but is a pointer in the right direction. It is a worthy book, collecting techniques from a variety of biomedical science disciplines, both old and cutting-edge modern, and is of much broader application than its title suggests, to researchers and those training in 'routine' medical laboratories alike. □

**S. L. Mera**

## Genome and Disease

*J. N. Volff, ed. Karger, 2006: 246pp. ISBN 3 8055 8029 0. €226.*

This is the first volume of a new series entitled 'Genome Dynamics'. It is a slim hardback book comprising 14 sections, all but one of which is multi-authored. Each section takes the form of a peer-reviewed paper reflecting a wealth and breadth of current research in this arena. Sections are short and comprehensively referenced – a typical 12-page section is supported by 125 references. Each section begins with an abstract and is supported by plenty of high-quality diagrams, illustrations and colour plates.

A selection of topics includes ageing and disease, colorectal cancer, Fanconi anaemia, Werner syndrome, ageing and cancer, as well as an overview of the genomic basis of disease, and mechanisms and assays for genomic disorders. The focus on disease and clinical application is welcomed; for example, the section on Nijmegen breakage syndrome explores the link between the cellular and molecular aspects and the clinical disease symptoms. In addition, a quote from the abstract on Fanconi anaemia states that "there is probably no other experiment of nature, in our species, in which the causes and consequences of genetic instability, including the role of reactive oxygen species, can be better documented and explored than Fanconi anaemia", thus defining the wider context of sections such as this concerning clinical and cellular phenotypes.

The authors succeed in highlighting the importance of the study of rare genetic syndromes as models that have led to greater understanding of normal processes such as ageing. Several sections explore the dysfunction of cellular mechanisms, such as DNA repair and chromosome segregation, which lead to tumour growth. Also reviewed are the caretaker genes for the control of genome stability.

As a specialist text, this book is highly recommended for researchers in cancer biology, haematology and molecular genetics. It heralds a promising new series. □

**J. A. Overfield**

## Clinical Applications of PCR

*Y. M. D. Lo, R. W. K. Chill, K. C. A. Chan, eds. Humana Press, 2006: 200pp. ISBN 1 588 29 348 3. $99.50.*

This book is the second edition of a successful text published some years ago. The polymerase chain reaction (PCR) technique, invented in the 1980s, has become an indispensable part of modern molecular diagnostics in biomedical science.

The first chapter describes the PCR technique comprehensively and any reader with some knowledge of molecular biology should be able to understand this. It gives the reader the foundations on which to approach the other chapters, which describe the application of PCR in a wide variety of areas of diagnostic biomedical science. There is also a well-written chapter on setting up a PCR laboratory, which addresses all the issues (e.g., contamination, avoidance and detection of the contamination).

An additional three chapters describe some of the latest innovations, such as real-time PCR and the identification of products using melting curve analysis. Also described is quantitative PCR, the use of which allows the operator to estimate how many copies of the original gene are present in the sample, which provides high sensitivity. A new application of this technique, which permits amplification of genes from embedded or whole tissues, has revolutionised investigative science. Human immunodeficiency virus (HIV) has been detected successfully using this technique.

The remaining chapters describe some excellent innovative applications of PCR and its modifications, which allow improved diagnostic methods in DNA/RNA mutations, diagnosing Epstein-Barr virus (EBV) infection and aneuploidy.

Generally, each chapter reflects the research interests of the contributing authors. It is well written and uses numerous very pertinent references. Each chapter gives an overview of the principle and also details of the methodology and associated problems.

Overall, this is a useful text and will be an important asset for a biomedical scientist undertaking molecular biology as part of their educational progression or within the workplace. □

**V. Edwards-Jones**

## Molecular Hematology

*D. Provan, J. Gribben, eds. Oxford: Blackwell, 2005: 324pp.*
*ISBN 1 40511255 7. £99.50.*

Haematology has a distinguished place in the history of molecular medicine. In 1949, in a seminal paper describing molecular differences between normal haemoglobin and sickle cell haemoglobin, Linus Pauling coined the phrase 'molecular disease'. Over 20 years later, studies of haemoglobin genetics were the first to demonstrate that mammalian genes contained non-coding, intervening sequences (introns) – an observation described succinctly at the time as "genes in pieces". Subsequently, globin genes were the first to be located in the human genome.

Growth in our knowledge of molecular biology, an ever-expanding armoury of sophisticated molecular techniques and rigorous application of the technology, has enhanced our vision of molecular disease in haematology. It is therefore timely that this expansion is reflected in a new multi-author edition of this text, which was first published in 2000.

The new edition retains an emphasis on the molecular basis of haematological malignancy. However, this has been significantly refreshed to reflect advances that have taken place over the intervening five years. New chapters on stem cells, secondary myelodysplasia and gene expression profiling in lymphoid malignancy have been added.

Chapters on non-malignant disease have also been updated and augmented by the inclusion of additional ones on, for example, the molecular basis of blood group antigens, von Willebrand disease and platelet disorders. This revision creates a fairly even division of focus between malignant disease (and related areas) and non- malignant areas such as altered haemostasis and intrinsic red cell disorders.

In general, the order of content is logical, with relevant chapters presented sequentially. However, I feel that the chapter on minimal residual disease may have sat more comfortably after consideration of the main types of 'malignant haematology'. Similarly, the final chapter on gene expression profiling seems out of place, and would have been better located closer to the chapter (10) on lymphoid neoplasms.

Individual chapters are well set out, with effective sectioning and clear figures. The style of writing invariably enabled difficult topics and concepts to be easily readable, even to the molecular amateur. I liked the use of the 'suggested general reading' component attached to each chapter. However, this seemed to vary significantly in scope, ranging from a smattering of taster sources in one chapter to an exhaustive list covering five pages in another.

The molecular basis of anaemia is addressed in a single chapter and I would concur with the authors' statement that this is "quite ambitious". This chapter covers a wide spectrum of topics, ranging from megaloblastic anaemia to red cell enzyme deficiencies. The strength of this chapter's concept is that it attempts to make the reader consider anaemia in a molecular context. The haemoglobinopathies are excluded from this chapter, as they are covered in two separate chapters that address the molecular pathology of haemoglobin (principally the genetic control of Hb and the thalassaemias) and structural mutations of haemoglobins, respectively.

I was disappointed to note that there was no chapter on red cell membrane (cytoskeleton) abnormalities. This would have complemented the previous chapters, with respect to intrinsic molecular defects of the red cell, and have established a clear link to the molecular basis of blood group antigens explored in chapter 20.

I was puzzled by a chapter entitled 'Autoimmune haematological disorders'. This contribution appeared primarily to reprise the principles of immune processes and general concepts of autoimmunity. There was little reference to haematological disorders, with the exception of idiopathic thrombocytopenic purpura – included as a model of an autoimmune blood disease – and a few assorted lines in a section relating to targeted versus untargeted therapies for autoimmune disease.

Overall, I found this book to be a fascinating and highly informative read. The wealth of material assembled – from a range of world experts – commends this book as a unique and authoritative text. I strongly recommend this edition of *Molecular Hematology* to all postgraduate students of haematology (of whatever ambition or age!). It should also serve as an excellent reference resource for molecular biologists. If engaged in the field of biomedical science/ medical education the latter are urged to dip regularly into this source. It contains a multitude of haematology examples to enliven and enhance their subject area. □

**D. S. McLellan**