

Book reviews

DNA Technology and its Forensic Application. G. Berghaus, B. Brinkman, C. Rittner and M. Staak. (eds) Springer-Verlag, Berlin. 1991. Pp. 226. Paperback, price £50. ISBN 3 540 54035 0.

This book contains the scientific contributions presented at an International Symposium on the forensic application of DNA technology, held under the auspices of the German Society of Legal Medicine on 13–14 September 1991 in Cologne, Germany.

There are 33 papers covering the entire range of DNA profiling, including multi-locus probes (MLP), single-locus probes (SLP), and polymerase chain reaction (PCR). Papers are divided into separate sections: PCR, Databases, Paternity, Stain analysis and Biostatistics.

The original multi-locus probe tests (33.15 and 33.6), developed by Alec Jeffreys in 1985, were quickly adopted for use in routine casework in some European laboratories such as the Forensic Science Service (U.K.) and Cellmark Diagnostics. Alternative multi-locus probes such as MZ1.3 (cloned from human DNA using M13) and oligo-probes such as (GTG)₅/(CAC)₅ were subsequently introduced by other laboratories. Hypervariable single locus probes have proved to be much more efficient for databasing purposes and also tend to be more sensitive — signals can be obtained with quantities as low as 50–100 ng genomic DNA. To achieve uniformity between laboratories, there needs to be agreement on control standards, restriction enzymes, statistical interpretation methods and probes. In North America, the restriction enzyme *Hae*III is in common use, whereas Europeans have chosen *Hin*II. The most widespread probe in use today on both sides of the Atlantic is undoubtedly the Nakamura probe pYNH24 (D2S44), hence there is probably more population data available for this locus than for any other.

The introduction of single locus probes led to questions on interpretation methods. Measurement errors due to electrophoretic distortion mean that it is not possible to identify individual alleles with certainty. It has become standard practice to use match rules or guidelines. Often, these rules are based on the standard deviation of measurement errors, although Bayesian models circumvent the need to adopt subjective criteria to define a match. Whichever method is used, the onus is on the forensic scientist to demonstrate that the statistical method used is conservative.

PCR adds a new dimension to forensic analysis; it is a powerful technique but needs to be used with great care to avoid contamination risks, especially from amplified products. Methods described include the HLA DQ alpha system, marketed in kit form by Cetus corporation. Detection of polymorphism is achieved by hybridization to

allele-specific oligonucleotide (ASO) probes (a total of eight different alleles are detected). The use of low molecular weight VNTR loci (e.g. D1S80, D17S5), analysed by conventional polyacrylamide gel electrophoresis, is becoming commonplace. The advantage of PCR systems compared to conventional DNA profiling using Southern blotting is the rapidity of the technique; hybridizations are unnecessary because visualization of bands can be accomplished using silver staining. Furthermore, sample extraction/purification is easy; the whole technique is much cheaper and less labour intensive.

Paradoxically, the changes brought about by research run counter to the twin aims of interlaboratory uniformity and continuity of technique. There is a danger of locking into outdated technology: in the future, a laboratory devoted predominantly to PCR may still be required to prepare DNA profiles using SLPs in order to compare results from a potential offender who has already been put onto a database prepared some years earlier. The transition from SLP to PCR databases (which will be incomparable) is a problematical exercise, therefore.

To summarize, the volume gives an account of current techniques which are either reported in case-work or undergoing research evaluation. It is unlikely to be of great interest to those outside the forensic field, although the techniques and interpretation methods described are directly applicable to population genetics. The field moves quickly — hence there is only a brief mention of the potential of MVR by Alec Jeffreys and there are no papers on microsatellites.

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Fundamentals of Plant Breeding. H. Kuckuck, G. Kobabe and G. Wenzel. Springer-Verlag, Berlin. 1991. Pp. 265. Hardback, price £36. ISBN 3 540 52109 7.

This book was first published in German in 1939 by the senior author. The fifth German edition appeared in 1985, so this English version of the book is in effect the sixth edition. Over the years the book has accumulated two further authors and four other contributors. The book attempts to cover the whole field of plant breeding. For example, there are sections on heritability and response to selection, seed production of hybrid varieties, periclinal chimeras, gene transfer, photorespiration, trial design and genetic conservation.

Unfortunately the book fails. The chief reason for this is that its style makes reading very difficult. For example, one section begins: 'The best breeding methods will not be successful if the technical prerequisites for extensive selections and comparative performance trials are not present in the individual steps of the breeding process'. I agree with this statement. I know because I spent 10 minutes working it out. Most of the book is written in this tortuous style.

Aside from the problem of style, the book fails adequately to cover many of the topics it tackles. This is inevitable. Plant breeding now involves so many disciplines that to attempt to deal with everything in a book of this length is doomed. If you have no prior knowledge of the subjects the book covers you are left confused. For example, the section on trial design comments on the merit of lattice designs for testing breeding material. However, there is no description of what a lattice design is, or how it works and no reference in the text to a source of this information. In fact the section on trial design does not describe any trial designs at all. It merely names them.

The preface to the book follows the customary line that plant breeders are doing their bit to save the world from starvation, but goes further in implying that plant breeders are reducing the greenhouse effect by helping to fix CO₂. This is a new one on me, and I shall certainly use it in self defence. However, I wonder what proportion of the World's plant breeders are in the job for these reasons, and what proportion are in it for the money, because they enjoy it or because it's the only job they can get.

In summary this is a badly thought out book which is unreadable. Buy it for your friends.

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Applied Molecular Genetics of Fungi. J. F. Peberdy, C. E. Caten, J. E. Ogden and J. W. Bennett (eds). Cambridge University Press, Cambridge. 1991. Pp. 187. Hardback, price £29.95. ISBN 0 521 41571 3.

This slim volume has its origin in a British Mycological Society symposium held at the University of Nottingham in April, 1990. The book comprises 11 chapters written by experts from Europe and the U.S.A. but, as the editors point out in their preface, it is not simply a collection of the written versions of all the symposium papers. What is presented is a concise, easy to assimilate and authoritative statement about the current status of applied molecular fungal genetics. The range of industrial and research applications benefitting from advances in the science are well illustrated throughout the publication.

The first three chapters provide admirable and readable summaries of the state-of-the-art. Van den Hondel and Punt

review transformation systems and vectors for fungi; Turner deals with cloning strategies for genes from filamentous fungi while Watts and Stacey discuss successes with novel DNA transfer technology (particle guns and electroporation).

There are three chapters on the various options for heterologous gene expression in fungi and their use in production of foreign proteins. Ogden provides an authoritative summary on the production of foreign proteins and the available expression systems in *Saccharomyces cerevisiae*; developments in the use of the alternative methylotrophic yeasts (*Hansenula polymorpha* and *Pichia pastoris*) in gene expression studies are dealt with briefly by Veale and Sudbery while the expression of heterologous genes in filamentous fungi (primarily *Aspergillus* spp.) is well covered in the chapter by Davies.

Four of the remaining five chapters deal with the impact of molecular genetics research on specific industrial applications. Penttila and colleagues deal with the molecular biology of cellulase and proteinase production by *Trichoderma reesei*. An interesting discussion of research on strain improvement in brewing yeast is provided by Hincliffe, while the contribution by Strasser and colleagues ranges more broadly over several industrial applications for genetically modified yeasts. The power of molecular genetic analysis to probe the pathways for synthesis of sulphur-containing β -lactam antibiotics (such as penicillins) is well illustrated by the contribution from Skatrud and colleagues.

The last chapter, by Oliver and colleagues, convincingly discusses the promise of molecular genetic analyses for revealing the bases for fungal pathogenesis of plants and thereby new opportunities for disease control. In any fast-moving field omissions are inevitable, but it is unfortunate that a treatment of recent advances in the transformation of oomycete pathogens is missing from this contribution.

A strength of this book is the various summary tables that allow ready access to useful bibliography. All chapters are also well punctuated with relevant diagrams although the editors have not been well-served by the rather poor electronic reproduction of some of these. I was also somewhat disappointed to find almost no mention of edible fungi throughout the text but this undoubtedly reflects the paucity of molecular genetic research effort focused on these economically important species. In summary, the four editors are to be congratulated for assembling a set of contributions with a coherence that frequently eludes symposium-related publications. I feel confident that this book will be an accessible source of reference for several years. For a work of this type these days it is fairly priced and I expect a substantial number of copies to find their way onto the book shelves of researchers in this advancing field and of those who teach courses with a significant content of industrial microbiology or fungal genetics.

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