

Book Reviews

DNA Technology in Forensic Science. National Research Council. Published by the National Academy Press, Washington D.C. 1992. 185 pages, soft cover. \$29.95. ISBN 0 309 04587 8.

DNA Fingerprinting: Approaches and Applications. Edited by TERRY BURKE, GAUDENZ DOLF, ALEC J. JEFFREYS and ROGER WOLFF. Basel: Birkhauser. 1991. 400 pages, hard cover. SFr 168, DM 198. ISBN 3 7643 2562 3.

The application of DNA fingerprinting in forensic science has had an interesting history. Invented in 1985 and successfully applied by Alec Jeffreys of Leicester University, both to catch a rapist and murderer and to settle a dispute about a mother–son relationship, it was enthusiastically taken up by the FBI and State police forces in the United States. The police chiefs wanted to have their own forensic DNA units, and some private commercial laboratories also joined the competition. An inevitable problem with these competing agencies was a lack of standardization of methods (e.g. in chemical protocols, choice of restriction enzymes and DNA probes, and statistical deductions); and defence counsel were often able, with the help of independent experts, to discredit the forensic evidence. By mid-1989 ‘a crescendo of questions concerning DNA typing had been raised in connection with some well-publicized criminal cases, and calls for an examination of the issues by the National Research Council of the National Academy of Sciences came from the scientific and legal communities’. The result was a committee set up in early 1990, and the first book listed above gives their report on these problems.

DNA Technology in Forensic Science brings out very clearly the problems faced by forensic laboratories in handling DNA fingerprinting. The samples are often degraded, contaminated or from multiple unknown sources, and sometimes the tests cannot be repeated because the sample size is too small. Typing often involves matching samples from a wide range of alternatives in the population and thus lacks built-in consistency checks; and, except where the DNA evidence excludes a suspect, assessing the significance of a result requires statistical analysis of population frequencies.

Where different laboratories carry out the forensic tests, it is essential that the staff involved in collecting,

handling and processing the material, interpreting the results and saving any surplus material for the defence or future use, should be very highly trained, with their skill checked regularly by an independent authority. Any advances in analytical technique also have to be checked before introduction. This is obviously all necessary so that a watertight case can be presented in court.

The book starts with a long summary, to help the busy reader, and an equally long introduction, which covers much of the same ground. Successive chapters then discuss in detail: Technical Considerations, Statistical Basis for Interpretation, Ensuring High Standards, Forensic Data Banks and Privacy of Information, Use of DNA Information in the Legal System, and DNA Typing and Society. There is also a useful list of organizational abbreviations (do you know what AFIS, ASCLD-LAB, CAP, NIST and TWGDAM stand for?), and a detailed glossary. Informative statistics quoted from the FBI’s Uniform Crime Reports are that there are about 20 000 murders and 100 000 forcible-rape cases a year; it is estimated that 30% of all murder cases and 70% of all rape cases are never closed by arrest, and that only some 50% of rapes are ever reported.

I think this is an excellent and very opportune book, which everyone interested in applied biotechnology, crime, DNA databases of criminals and others – and their possible misuse – should study. The reader may not agree with all the proposals, and he/she should ask why no similar study has been made of the application of DNA fingerprinting in the British legal system. Does the presence of Alec Jeffreys in Leicester ensure that the suspected rapist-murderer gets a fair deal? At least, the first murder case in which DNA typing was used – the Enderby murder case in October 1986 – resulted in a prime suspect being proved innocent.

DNA Fingerprinting: Approaches and Applications reports the First International Symposium on DNA Fingerprinting, held in October 1990, and presents what the editors describe as a compilation of some of the many papers given by the 270 delegates. The general topics covered include Molecular Genetics of Hypervariable DNA (eight papers), Population Genetics and Evolutionary Biology (seven papers), Economically Important Animals and Plants (eight papers),

Implementation of DNA Typing (six papers), and a subject index.

These 29, mainly substantial, papers cover so much ground that it is impossible to summarize them all here. The first paper, by Jeffreys and his team, gives an excellent review of the development of multilocus and single locus minisatellite probes and the use of PCR, and discusses the biological properties of the unstable regions of DNA which form the basis of almost all DNA fingerprinting systems. Other papers in this section discuss the generation of variability at VNTR loci in human DNA (R. Wolff *et al.*), Oligonucleotide fingerprinting (Epplen *et al.*), and using minisatellite probes to detect a somatic mutation in the Proteus syndrome (C. E. Schwartz *et al.*) – now believed responsible for the condition of Joseph Merrick, the famous Elephant Man.

In the section on population genetics, there are several critical theoretical papers as well as one on 'Helpers at the nest in European Bee-eaters' (C. S. Jones *et al.*): DNA fingerprinting is used in this study to confirm that European Bee-eaters invariably help relatives at the nest, but do not contribute paternity or maternity to the brood they help. Hannotte *et al.* describe the large-scale isolation of Indian peafowl minisatellite sequences and discuss the evolutionary conservation of the cloned loci in the Phasianidae. Longmire *et al.* investigate genetic differentiation and migration of North American populations of the Peregrine Falcon.

Studies on economically important animals and plants include the chicken, salmonids and tilapias, two-dimensional DNA fingerprinting in animals, applications in plant breeding, oligonucleotide fingerprinting in plants and animals, and study of plant sequences homologous to human hypervariable minisatellites. The final section, on implementation of DNA typing, covers problems and new developments in forensic work, quality control of cell banks, and use of automated electrophoresis and fluorescence for genetic typing.

DNA fingerprinting is obviously a very thriving business, with an ever-increasing variety of applications. This symposium volume, in which each paper is very well referenced, including papers in press or submitted by not yet accepted, makes gripping reading and should be available in every biological library. I look forward impatiently to the proceedings of the next symposium; and many readers will be glad to learn that Bill Amos and Josephine Pemberton in Cambridge (the English one) have established an informal newsletter 'Fingerprint News', which is playing a major role as a forum for DNA fingerprinters.

ERIC REEVE
Institute of Animal Genetics
University of Edinburgh
West Mains Road
Edinburgh EH9 3JN

More Gene Manipulations in Fungi. Edited by J. W. BENNETT and L. L. LASURE. Academic Press. 1991. 470 pages. £45.50. \$75.00. ISBN 0 12 088642 1.

It is well known that, in the world of the cinema, sequels are almost invariably inferior to the original. Thus the release of 'Jaws 4' is more likely to induce a yawn than a rush to the cinema queue, and 'Citizen Kane reborn' would surely be an attempt to gild the lily. Does the same rule of thumb apply in the literary world? Are most attempts to build on previous success doomed to inferiority? These questions are relevant because *More Gene Manipulations*... is a follow-up to a highly successful volume, which rapidly established itself as a valuable reference work on the bookshelves of every fungal researcher. It is natural to wonder whether the success can be repeated.

Given the undoubted value of the first volume, I was pleased to find that when I reviewed it I had reacted favourably. I had been impressed both by the high standard of the contents and the range of subject matter covered. In my view this excellence is maintained in the present work. Like its predecessor the book is divided into sections, this time entitled: Diversity and Dimorphism; Tools of the Trade; Molecular Morphogenesis; Meiosis, Mating types and Mysteries; and Mycotechnology. In addition there are useful appendices.

As in the original, this compendium starts with a review of considerable general interest, written on this occasion by Perkins. He considers diversity and speciation in fungi and, in considering the diversity of mating-type systems, provides a foretaste of the later section covering the subject of meiosis and mating type. This area is particularly topical, and it is no surprise to find that the book contains useful reviews of the cloning of mating-type genes from both ascomycetes and basidiomycetes. Also included in this part of the book are accounts of gene mutation through RIP (Repeat Induced Point-mutation) in *Neurospora* and gene silencing (named Methylation Induced Pre-meiotically) in *Ascobolus* which are phenomena under active investigation in several laboratories at the present time. It is this mixture of general overview and detailed review of particular systems which is one of the strengths of this book.

Having found a successful formula, the editors have stuck to it, and once again there is a deliberate attempt to cover a wide range of different topics, which means that all readers will be able to discover something that is new to them. I enjoyed reading the section on mycotechnology and being introduced to the intricacies of heterologous gene expression through a comprehensive review by Cees *et al.*, whilst an account of β -lactam production by Skatrud was equally informative. Apparently at the present time the annual production of penicillin and its derivatives is sufficient to provide at least one round of therapy for every person on earth. The manipulation of β -lactam