

50 are to works by Orel himself either alone or in collaboration). The reference to my own paper 'Are Mendel's results really too close?' is not, I hope and believe, typical of the accuracy of the references in general: my name, the title of the paper, the name of the journal, and the volume of the journal all possess errors of varying degrees. The very density of information which the biography contains does not make for easy reading, so that its value will be more that of an encyclopedia than a life (fortunately there is Orel's own *Mendel* in the Oxford University Press 'Past Masters' to fill the gap).

The question 'Are Mendel's results really too close (and, if so, why)?' is of enduring interest. In 1902 Karl Pearson's friend W. F. R. Weldon had been the first person to apply statistical tests to Mendel's data, at one point applying Pearson's new χ^2 -test, but although in correspondence with Pearson he expressed surprise at the good fit of the data to the Mendelian ratios, he added 'I do not see that the results are so good as to be suspicious'. It was Fisher's 1936 analysis that suggested such a possibility. Orel oddly remarks 'No one has been able to explain why the criticism made by Fisher (1936) remained unnoticed for so long, until Zirkle (1964)...'. Fisher's paper was referenced at the end of the chapter 'Mendel's principle of segregation' in the standard textbook *Principles of Genetics* by Sinnott, Dunn and Dobzhansky (1950 edition) from which many of my generation learnt our genetics, and which contained an English translation of Mendel's paper. Although from 1936 until the Mendel centenary in 1965 rather little was published about Mendel, knowledge of the strange results was commonplace in genetical circles.

Orel reviews the many discussions of the problem in the post-1965 literature, but without any definite conclusion of his own: 'One can suppose that in future there will be further differences of opinion'. Referring to a recent paper of his with D. L. Hartl he says 'Thus the uncertainties in the experiments and ambiguities in this analysis discredit any inference of deliberate manipulation or falsification of data'. No serious student has ever suggested that Mendel deliberately manipulated or falsified his data (one should discount the colourful language in private letters by Weldon and Fisher), but the segregations do exhibit strange features which in my view have defied all attempts to explain them. It is unlikely that any further evidence will come to light, and the discussion now tends to revolve around the minute examination of Mendel's German, to which not everyone can contribute.

On this and other questions Orel painstakingly reports on the secondary literature. To use a modern metaphor, his book enables one to surf the whole subject of Mendel, his antecedents, his contemporaries and his successors. It will be an invaluable reference for all historians of science, probably never to be bettered. Only in one respect is it deficient – it

fails to reprint one of the English translations of the great paper. To do so would have added only 10 percent to the book's length but 50 percent to its value.

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Genetics and Cancer: A Second Look. Edited by B. A. J. PONDER, W. K. CAVENEE and E. SOLOMON. Cancer Surveys Vol. 25. Cold Spring Harbor Laboratory Press 1995. 250 pages. Cloth cover. Price \$75. ISBN 0 87969 469 6.

The current pace of gene identification and characterisation in the field of cancer genetics has ensured that much has changed since 'Genetics and Cancer' appeared in the Cancer Surveys series in 1990. The subject certainly needed reappraisal and this volume does indeed deserve a second look.

An introductory chapter by Robert Weinberg gives a good overview of the history of cancer gene identification, putting into perspective the past and present research. It compares the discovery of oncogenes with the current flurry of tumour suppressor gene (TSG) identification, and examines how the methods used for discovering these genes have influenced the types of genes recovered. The emphasis on genes involved in control of cell growth and differentiation is apparent, and Weinberg speculates as to how this imbalance may be redressed by the cloning of genes involved in other aspects of cancer development such as tumour immunology and angiogenesis.

The increasingly important role for transgenic mice in providing new models for the study of cancer genes is presented in a chapter from Sharan and Bradley. These models provide an opportunity to study the effect of defective genes in the context of specific tissue types as well as that of different genetic backgrounds.

The contribution of cancer epidemiology to the identification of causes of cancer is covered in a chapter by Elizabeth Claus. She outlines the types of statistics-based studies which use the occurrence of cancer in populations to determine the contribution of genetic or environmental factors. She also describes how patterns of cancer risks observed amongst the relatives of cancer patients have been used to derive genetic models.

One of the results of studying the patterns of cancer development in large populations has been the identification of the association of polymorphisms in enzymes involved in the metabolism of xenobiotic toxins with susceptibility to cancer. A chapter by Gillian Smith and others gives details of how specific alleles of these enzymes are thought to predispose to the development of tumours. Other mechanisms of cancer development are covered in chapters on nucleotide excision-repair, imprinting and a very

thorough chapter on apoptosis, giving the reader a feel for the breadth of the research going on in the field of cancer genetics.

A lot has been learnt about cancer initiation and development through studying cloned disease genes. RET, NF2 and VHL are covered in separate chapters which describe the identification of the genes, and what is known about the mode of action of the proteins they encode. Those genes involved in the production of embryonal tumours, RB, WT1 and NF1, are covered in an additional chapter which also discusses the clinical implications of advances in our understanding of them. Other chapters in this substantial volume are devoted to particular types of cancer including malignant melanoma, lung cancer, brain tumours, breast cancer, intestinal neoplasia and prostate cancer. They present recent developments in the understanding of these common cancers and propose future prospects in the field.

There is, naturally enough in a book of this nature, a chapter devoted to the most intensively studied of tumour suppressor genes, TP53. After a general introduction to the gene and TP53 protein function, it concentrates on describing what is known about the germline mutations present in patients with Li-Fraumeni syndrome. Analysis of TP53 has reached a stage at which mutation screening and gene therapy are being developed for potential use in diagnosis and treatment of cancer. This is one of the first TSGs to have reached this stage and the research is bringing to

the fore issues which will become important if TSG mutations are to be used as molecular diagnostic tools. The potential ethical problems associated with genetic testing for cancer gene mutations are discussed in more detail by Garber and Patenaude in the final chapter. This is an important area for discussion amongst cancer researchers, and one which will become increasingly difficult to manage as our understanding of the cancer field becomes more complex.

The problem with molecular biology texts of this size is that they tend to be out of date as soon as they are published. Recent findings omitted from this edition include the discovery of the BRCA2 gene from the chapter on breast cancer, and from the chapter on Von Hippel-Lindau disease the finding that the VHL gene complexes with elongin and is involved in the progression of transcription – a novel function for a TSG. However, many of the chapters provide valuable background information which will enable researchers to widen and update their knowledge outside of their own specialist area. In general, the chapters are stimulating and well written by leaders in the respective fields. This volume should remain useful for at least another six years, which is a long time in the field of cancer genetics.

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