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Book Reviews

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Encyclopedia of Genetics. Edited by E. C. R. Reeve. 2001. Fitzroy Dearborn Publishers. 970 pages. ISBN 1 884964 36 6. Price £105. (hardback)

What do you need an encyclopaedia for? Ignoring any immediate need for guidance on English grammar, it is normally a book or set of books that sits on your shelf, never to be read except as a ready source of reference on topics outside the immediate area of your own specialisation. The field covered by an encyclopaedia can be very broad; *Encyclopaedia Britannica* will refer to virtually everything that has ever been known. Alternatively, the field can be highly specialised. I once chanced upon an Encyclopaedia of Embroidery Stitches, which may well be an indispensable companion to those who embroider, especially those needing further instruction. This poses an immediate dilemma. The bigger the field, then obviously the less detail you can expect on any particular patch of it. You would not turn to *Britannica* for the minutiae of embroidery stitches though, to be fair, I have not checked. But if that was the level of detail that I sought, I should be disappointed if I did not find it in the specialist volume. This brings up another crunch issue. The ease of finding is itself an absolute requirement. It is of no use for the information to be there if you cannot find it, and find it quickly. That is precisely why you turned to the encyclopaedia in the first place, because it is quicker than any other means of search, including electronic means.

The volume under review is called *Encyclopedia of Genetics*, so what might we expect? The field is defined by the title, so we need not expect much spread into contiguous areas, like experimental embryology, reproductive physiology or statistical analysis; we do, in fact, find some spread into these areas and several more. But within the fairly well-defined limits of genetics (and we need not argue about precise definitions), we should expect an encyclopaedia to be comprehensive, accurate, understandable, synoptic, concise and – above all – arranged so that specific information is easy to find. There are other features which we could not, and should not, expect to find. It would be unreasonable to expect an encyclopaedia to remain up-to-date for long; indeed, there are reasons why it may not be totally up-to-date when written, if the writer is also preparing the material for a primary journal. Further, an encyclopaedia should not delve into contentious issues if the outcome is as yet uncertain. Nor should it become bogged down in complex arguments that may fascinate a handful of experts, but which bore the rest of the world. There is plenty more that could be said on what to expect or not expect of an encyclopaedia. This leads to one very clear conclusion: there is nothing easier than to criticise, or condemn even, any encyclopaedia, compendium, handbook, dictionary, manual, companion or call it what you will. It will never please everybody. Indeed, it would be a wonder if it entirely pleased anybody.

This book is a work of immense scholarship – a compilation of expert review articles by some 150 different authors. This team was assembled and managed, if that is the word, by one editor with the help of one assistant editor. Anyone with the experience of trying to get even six people to submit manuscripts on time, however liberally you define time, will not believe that this book happened. But happen it did, and the sheer logistics alone are mind-boggling. I wish I could find some more literary term than that last one, but none of them boggles the mind quite to the extent that I want.

The book takes its topics for review from the whole realm of genetics. The treatment is always authoritative, as far as I can judge, though neither my judgement nor anyone else's count for much in the context. Most of the book discusses material that is unfamiliar to most readers most of the time. What I can claim with more confidence is that the treatment is informative and often readable. In sampling the book for passages which I hoped I could read intelligently, I found it all too easy to wander into sections that I had not meant to explore, at least not then. The articles are roughly grouped either by type of organism or by topic, and if this leads to certain anomalies, well, classification systems usually do. The book starts with the origins of genetics (where else?), followed by sections on micro-organisms, animals, humans and plants. It then moves on to organelles,

structures, functions, DNA-based genetic analyses and, finally, biotechnology. This list, as it stands, looks rather bald, and does not fully convey the breadth of coverage. Even so, reasonable people will understand that it would have been impossible to include absolutely everything. Choices had to be made and some things had to be left out.

Being myself one of these reasonable people, I share their understanding. Nevertheless, some of the omissions struck me as odd. There is nothing at all on chicken genetics, apart from a reference to page 361 (which should actually have been 362) where we are told in the passing that chickens are being mapped. We shall let pass that this snippet appears in a section on ''Other Mammals''. But chickens are in good company. Guinea pigs and rats are also absent, as are fish, unless you want to check on Fluorescence in situ Hybridization. Other gaps also bother me. I seem to recall that during my working life, there used to be whole laboratories working on blood groups, usually with some polymorphism story attached. Talking of polymorphisms, I wonder what ever happened to all those snail shells that people used to collect? Something, surely? Now that I am in a reminiscent mood, there were other things that used to be around, too. What, if anything, came out of decades of work on *Aspergillus*? As I had an encyclopaedia on hand, I thought I might look it up, but found nothing. Genetics of course moves on, and whole areas of work get new foci, and acquire new vocabularies. That, I trust, is what happened to the areas mentioned in this paragraph. I should hate to think that none of them ever produced anything worthy of a separate index entry in a book like this.

As you would expect, the book is loaded with references. Each chapter has its list, sometimes more than one, if they change key in the middle. Sometimes, they provide other references for further reading, presumably for those not satisfied with what they have told already. However, the references are not gathered in the one place, possibly a sensible precaution against any reviewer doing the obvious and easy test of acceptability. They need not have worried; no valid reviewer would have far to look for material to swell the ego.

Each chapter also has its glossary of technical terms, and the entries may or may not be duplicated in a general glossary at the end of the book. It struck me that these glossaries might have been more useful had they all be combined – easier to find something, for a start. The exercise would not necessarily have yielded a mini-encyclopaedia, but it might have led to the first stab at a useful dictionary of genetics.

It was suggested above that the book is less than encyclopaedic in its compass. Other aspects too make me think that the book is not well served by its title. I set out earlier my expectations of a encyclopaedia. The volume meets some of them very well. But it is not synoptic, it is not in the nature of review articles to be concise, and it is often difficult to find exactly, or even approximately, what you want. You may want to discover how some areas have been affected by QTL-thinking of late. The index gives you a choice of ten entries, some several pages long, and others split between different parts of the book. You may or may not find what you sought, but you will end up with a syllabus for extensive further study. However, these widespread activities are notoriously difficult to catalogue, and topics don't come much more widespread than QTLs these days. All right, let us be fair and ask something sensible. Suppose you want to know what is meant by proteolytic cleavage, because your colleagues talk at you as if you knew. The index offers you nothing, neither does the general glossary. But if you were diligent and persistent, you would eventually find it, in one of the chapter glossaries. And a very clear statement it is too, exactly what you wanted. So where is it to be found? It comes at the end of a chapter on meningitis – not exactly where I first thought of looking. What use was made of proteolytic cleavage in meningitis research, I did not quite discover, but it must be something to do with virulence factors in different bacteria. I must read this chapter again, this time with more care.

It would be easy to multiply many-fold the kind of difficulty mentioned in the last paragraph. However, that would be pointless and, frankly, churlish. The book may not serve you well as a look-me-up, ready-access encyclopaedia. But it is still a superb collection of learned articles on a wider range of genetical topics than I have ever seen before, and probably will ever see again. An encyclopaedia for easy reference it may not be, but if you read it all, absorbed and retained all its contents, you yourself would become known as a walking encyclopaedia. For those with ambition, the sooner you start, the better.

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The Cloning Sourcebook. Edited by A. J. Klotzko. Oxford University Press. 2001. 348 pages. ISBN 0 19 512882 6. Price £27.50. (hardback)

This is not, as the title might imply, a do-it-yourself manual but rather a book of opinion. It starts with the transcript of an interview, conducted by the editor, with the leading members of the Roslin team that cloned Dolly and Polly. They explain their motivation and disclaim any intention of becoming involved in cloning humans. There are then two fairly brief but well-referenced review chapters by Anthony Perry and Steen Willadsen on the development of the techniques of mammalian nuclear transfer that made cloning

possible. The following 22 chapters express opinions, mainly about the ethics and possible regulation of human reproductive cloning. The contributors include a sprinkling of scientists, lawyers and administration but are predominantly bioethicistss.

Bioethics as an academic subject has enjoyed a great recent expansion, particularly in the USA, but it is not clear, at least to me, what special kind of expertise its practitioners are supposed to have. Whatever it is, it is evidently compatible with a range of disparate viewpoints. The clearest exposition of what I take to be the mainstream view is provided by Arthur Caplan, of the University of Pennsylvania, who gives two reasons for judging human reproductive cloning to be unacceptable. The first is the suspicion about its safety. Even if the success rate of non-human mammalian cloning were to be greatly improved, the first extension of the techniques to humans would inevitably be fraught with uncertainty and arguably a trespass into the forbidden field of human experimentation. Caplan's second reason, echoed in the title of Soren Holm's essay, ''Under the Shadow'', is the probability that a child produced as a genetic copy of an adult would have to bear a heavy burden of expectation. He or she would supposedly be genetically equipped to repeat all the successes of the clonal parent, and, with the benefit of the latter's experience, to hit more targets the second time round. We would most of us agree with Richard Dawkins' statement, reported here, that it would be fascinating to follow the career or a junior edition of oneself, but few would think it right from the point of view of the junior, and neither, I suppose, would Dawkins.

These fears about the possible consequences of human reproductive cloning are widely shared, but they are by no means accepted by all the bioethicists represented here. For example, Peter Singer, Professor of Bioethics at Princeton, rejects both of them. On the safety issue, he points out that even normally conceived infants are not free of risk, and that, although we know that a grossly underweight infant is in danger, we see nothing wrong in trying to rescue it. He concludes from this that we should accept cloning, risky as it may be, and try to rescue the clones as necessary. This is surely a *non sequitur*. And, to rebut the argument about the burden of expectation, he relies on our ready acceptance of identical twins. This argument, though it is brought forward in several places in this book, misses the crucial point of age difference. Identical twins grow up together, usually with strong mutual support but with neither having priority, whereas a person produced as a clone of his father may be expected to repeat, with improvements, a life already lived. Perhaps even more dubious is the pro-cloning argument of Professor Gillon, of Imperial College. What about the right of life of the potential clone, he asks? Although its safe development may be uncertain, its only alternative is not to exist at all. However, as Gillon admits, most would think it unnecessary to worry about the human rights of hypothetical people who do not as yet exist.

It is a sign of the times that only one of Klatzko's contributors invokes God, and then perhaps not in an altogether religious spirit. Lee Silver, a neurobiologist from Princeton, thinks that the only reasons for opposing human reproductive cloning must be theological, and he confronts believers with the assertion that if God had not intended us to clone ourselves he would not have made it possible for us to do so!

The question of the legal control or prohibition is addressed at the end of the book, which has summarises of the reports of three groups of advisors: The Biotechnology Group for the European Commission, the Joint Working Group of the UK Human Commission Advisory Group and the Human Fertilisation and Embryology Authority. They all come firmly to the conclusion that human reproductive cloning should be illegal, but perhaps there is still some scope for the lawyers, at least in borderline cases. For example, there are proposed practices that would involve nuclear transfer but not actual cloning, such as the plan mooted in Andrea Bonnicksen's article for helping mothers suffering from defects in their mitochondrial DNA to have normal children. The idea is for the mother's unfertilized egg nucleus to be transferred to another woman's enucleated egg, which would retain its normal mtDNA, and then to fertilise the chimeric egg *in vitro*. And even actual cloning does not necessarily multiply clones. In the hard-case example, imagined by Gillon, of a woman who has lost her husband and their only child in a car accident, and wants to rescue the genome of the child, the wish is only for replacement not repetition, though the safety objection would still apply. Some libertarians, represented here by Rosamund Rhodes of the Mount Sinai School of Medicine, think that the freedom of individuals to reproduce as they please should be paramount, but it is difficult to regard such freedom as a human right when only the rich would be able to afford it – cloning is highly unlikely ever to become available on the NHS!

In summary, this is an interesting and provocative book, with some value in displaying current ethical confusion. But readers who want to define their own bioethics, or just to learn about the science, will not be much helped by it.

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