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Book reviews

The Thread of Life: The Story of Genes and Genetic Engineering. Susan Aldridge. Cambridge University Press, Cambridge. 1996. Pp. 258. Price £16.95 (US$24.95), hardback. ISBN 0 521 46542 7.

The author intends to take us behind the headlines of the 'gene revolution' that is launching the world, headlong, into the era of genetically engineered foods and drugs, genetic screening, gene therapy, and transgenic crops and animals. Some will see it as a 'brave new world' of reductionist science gone awry. But Aldridge aims to reassure us that there is probably nothing to be too concerned about. It is written in a fluent and beguiling style, well-suited for the purpose.

The book covers a lot of ground starting from the history of the discovery of DNA which led to genetic engineering and its potentials which include cleaning up the environment and a 'greener' agriculture. The last part of the book gives a nodding acknowledgement to those who oppose the 'overemphasis on DNA in biology, leading to a kind of reductionism, which has alienated the public and some scientists, from (*sic*) its benefits', and mentions some new ideas that have emerged over the past 20 years.

This makes it clear where the author herself is coming from — a reductionist scientist who starts the first Chapter with the title, 'DNA is life's blueprint'. In so doing she has ignored a whole parallel tradition that goes back to Darwin himself and beyond, which see heredity as inseparable from development and from the environment in which the organism develops. The most significant research findings of the recombinant DNA revolution is that DNA is not the constant genetic blueprint or programme portrayed by the Central Dogma of molecular biology in the late 1950s and 1960s. Instead, it is dynamic and fluid. It is subject to alterations in the course of development and in response to the environment. This should make us see heredity in a truly non-reductionist, organicist context, as distributed over the entire gamut of interrelationships between the organism and the environment, from the socioecological to the molecular genetic. Although Aldridge does mention the discovery of the fluid genome, she has failed to see the implications. Like the whole genre of popular books intended to inform the public, it serves to obscure the real issues by its superficial treatment.

She downplays the hazards of transgenic technologies. 'In a very real sense, there is nothing special about gene transfer – it has been going on for billions of years', she says in the Preface, 'its potential comes from humans, rather than the blind forces of evolution.'.

So-called 'blind' nature has been doing very well indeed before humans messed it up with greenhouse gases and CFCs. More specifically, horizontal gene transfers were relatively rare in our evolutionary past, and there is substantial debate on the extent to which it has really occurred. Human activities including transgenic technologies, on the other hand, have and will increase the frequency and scope of horizontal gene transfer enormously. Recent findings indicate that horizontal gene transfers and recombinations are involved in the rapid spread of multiple antibiotic resistances among pathogens as well as in generating new virulent strains of pathogens. Transgenic technologies depend, to a large extent, on the construction of mosaic gene amplification and gene transfer vectors that break down species barriers and are therefore potentially much more infectious than those that previously existed in nature. There is already abundant evidence that even 'crippled' laboratory strains of bacteria and viruses can survive indefinitely in the environment, the teeming microbial populations serving as a horizontal gene transfer highway and reservoir for released vectors and transgenes (reviewed in Ho & Tappeser, 1996). The ecological effects resulting from the spread of herbicide or insect resistance similarly, should not be underestimated. Herbicide-resistant oil-seed rape has already spread transgenes to weedy relatives by ordinary cross-breeding. Meanwhile, the release of transgenic plants containing an insecticidal gene from the bacterium *Bacillus thuringiensis* has led to the rapid evolution of resistant insect pests, thereby rendering a previously relatively 'environmentally friendly' pesticide useless.

Finally, Aldridge disposes of the ethical and political dimensions of patenting DNA sequences and human cells lines by reminding us how much money is involved in the commercial exploitation of gene biotechnology. Of course, if genetic engineering is nothing new as nature has been doing it all along then there is nothing that should be patented either. This is where gene biotech industries want to have their cake and eat it too. The 'patenting of life' not only offends our basic sense of being human but also involves the exploitation of genetic resources of Third World Countries and erosion of farmers' rights all over the world. The public does not need to be lulled into a sense of complacency about genetic engineering. I hope someone will write a good, really well-balanced book. This, unfortunately, is not it.

References

HO, M. W. AND TAPPESER, B. 1996. Transgenic transgression of species integrity and species boundaries. In: Mulon-

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An Introduction to Genetic Analysis (6th edn). Anthony J.F. Griffiths, Jeffrey H. Miller, David T. Suzuki, Richard C. Lewontin and William M. Gelbart. W. H. Freeman and Company, New York. 1996. Pp. 915. Price £27.95, hardback. ISBN 0 7167 2604 1.

Undergraduate genetics courses, and textbooks, come in two varieties: those which begin with Mendel and move on to molecules, and those which start with the structure of DNA and leave more abstract notions of genes until later. *An Introduction to Genetic Analysis* is clearly in the former category, aiming for a balanced approach between classical and molecular genetics but teaching the subject in a more-or-less historical sequence. Ultimately, however, the success or otherwise of a course (or textbook) depends less on the order of topics than on how well it is taught. I can report that Griffiths *et al.* teach genetics very well indeed.

This sixth edition retains all the features that have made it such a popular text with students and tutors. The stated aim of the authors is to explain genetics primarily in terms of the analytical approaches available. In this it succeeds superbly. The text is clear and easy to read with many examples illustrating key experiments and major points. To aid comprehension, key concepts are listed at the beginning of each chapter, highlighted as 'boxed messages' embedded in the text, and summarized at the ends of chapters. A particular strength is the inclusion of a large number of problems at the end of each chapter, many new for this edition, including 'chapter integration' and 'concept map' problems to aid revision and keep educationalists happy. Example problems are present and, new for this edition, 'unpacking the problem' exercises give hints for finding solutions. An annoying feature is the three-to-one ratio of unanswered to answered problems — and why is it always the tricky ones which don't have an answer in the back? The solutions exist, of course, but it is necessary to purchase a separate study guide to obtain them all, which will not be appreciated by puzzled students on tight budgets.

What else is new in this sixth edition? Presentation has been improved by the extended use of colour and subtle typographical and layout changes (tables are now highlighted in pastel shades) and the addition of many good new photographs. Updating of content has occurred throughout the book, but the major changes are concentrated, unsurprisingly, in those chapters dealing with fast-moving molecular genetic topics. The biggest improvements are in the molecular techniques chapters. These have been rewritten so that the logic of gene cloning strategies is now clearly apparent, including cloning by tagging, functional complementation and positional cloning as well as oligo design and ORF analysis. Reverse genetics, gene replacements and gene therapy are newly included and particularly welcome is an entirely new chapter on 'Genomics' describing strategies for mapping and sequencing whole genomes. The result of these changes is that the major techniques of modern molecular genetics are now very clearly outlined prior to discussion of more specific topics in the following chapters. In these subsequent chapters, developmental genetics has expanded with a new chapter on cell biology including such topics as cell cycle genes, the cytoskeleton, intercellular communication and the genetics of cancer. The genetics of pattern formation during development is now illustrated using *Drosophila* examples throughout, giving a more coherent treatment to this subject.

Several teaching aids complement the textbook. In addition to the study guide and a selection of illustrations on overhead transparencies, there is now also a CD-ROM available containing all the illustrations from the book, and an instructors' manual. These aids are available for purchase, although recognized tutors recommending the text may be able to obtain some of them free if their class size is sufficiently large (no problem then for teachers in UK universities).

It may not hold all the answers, but *An Introduction to Genetic Analysis* is an excellent text for undergraduate genetics teaching.

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Essential Genetics. Daniel L. Hartl. Jones and Bartlett, Massachusetts. 1996. Pp. 458. Price £17.95, paperback. ISBN 0 86720 883 X. **Genetics (3rd edn)**. Daniel L. Hartl. Jones and Bartlett, Massachusetts. 1994. Pp. 584. Price £19.95, paperback. ISBN 0 86720 870 8.

The dedication in the 1994 third edition of the excellent textbook *Genetics* by Hartl is 'This is Christopher's book'. The dedication in the 1996 *Essential Genetics* is 'This too is Christopher's book'. The puzzle that I set about trying to solve is 'Why would Christopher want a copy of *Essential Genetics* if he already has a copy of *Genetics*?' In content the two books are very similar. But *Genetics* is a bit longer and has chapters on 'Extranuclear Inheritance',