convinced after reading this book that the simple prescriptions popularly associated with computer technology are wholly inadequate if one is to come to a meaningful understanding of computers in society. To that end, teachers wishing to devise a condensed 'social issues in computing' course may be attracted to this text. Also, those beginning social research in a particular area of computer technology may find the text useful to gain familiarity with a particular subject area. An author index and a more comprehensive subject index would be useful enhancements here. While the computer phenomenon is still very much, as Garson puts it, '... the elephant still to be perceived part by part by the proverbial blind men ...', *Computer Technology and Social Issues* does add some useful detail. As to what makes this 'elephant' behave in the way that it does Garson proposes a political model for his readers to consider. It is questionable whether Garson has provided sufficient proof in this text to convince his sceptics.

William Tibben
University of Wollongong
Wollongong, Australia

Improving Nature? The Science and Ethics of Genetic Engineering

Michael J. Reiss and Roger Straughan

Cambridge, UK, Cambridge University Press, 1996, x + 288 pp., AU$39.25 h.b., ISBN 0 521 45441 7

This is a clearly written introduction to, firstly, some of the principal techniques used in 'genetic engineering' (a hold-all term which the authors mainly use for recombinant DNA technology, but under which they also include traditional selective breeding as well as genetic screening and gene therapy in humans), and secondly, some of the ethical issues involved. The book's title appears to be derived from a quote (p. 216) from George Pazin, a professor at the University of Pittsburgh School of Medicine: 'I am all in favour of repairing God's creation with the genetic tools that we have discovered, but I shudder to think of our trying to improve upon the creation.'

An interesting aspect of the book is that one of the authors, Reiss, is an Anglican priest as well as a senior lecturer in biology at Cambridge,[1] and the other, Straughan, is a moral philosopher as well as an educationalist. This mix of skills should ensure a sympathetic understanding of the varied needs of non-specialist readers, and it does. However, it also results in what at times comes through as a somewhat non-committal attitude, whether intentionally or not. In their Introduction for example, the authors explain that 'our main hope is to clarify the biological and philosophical issues involved' (p. 1). This sounds reasonable enough, but it also reminded me of some harsh things Steven Pinker, in *The Language Instinct*, had to say about 'clarifying' ethical questions. In fact, according to Pinker, most people, of whatever culture, are remarkably able to agree on essential notions of right and wrong behaviour, and that such questions should not be left to 'taste, custom and self interest'.[2] To be fair, the authors do say, on page 239, that they *do not* subscribe to the 'currently fashionable 'subjectivist' view that what I think is right is right for me', and that 'moral beliefs are consequently merely matters of personal taste'; nevertheless, the book suffers from a lack of obvious commitment up until that point (5 pages before the end), and even then, in the book's last paragraph, the authors wish to emphasize that 'it is over simplistic to attempt to reach any overall conclusion about the rightness and wrongness of genetic engineering *per se*.'

Maybe, but this is hardly a very useful sentiment to leave in the reader's mind. As Raymond Gaita has pointed out in a recent article,[3] the most interesting authors are those who have *something to say*. Perhaps a more effective concluding section would have been to remind readers of some of the notorious 'ethical' positions of various scientists cited earlier in the book, and upon which the authors *do*—though hesitantly at times—pronounce judgement. An unnamed professor of medicine, for example, is quoted as calling for abortions to be 'carried out more carefully to ensure that the f[o]etus emerges alive so that its organs can be used for medical purposes' (p. 214), and a Dr Jan Heideman, who did 'pioneering' work which led to the genetic engineering of the 'oncomouse' (which develops cancerous tumours) felt that all he needed to do was to cite the *utility* of such use of mice, as against laboratory rats, since 'a rat's skin cannot be peeled off as can the skin of a mouse' (p. 184).

Utilitarianism as a philosophy is fairly clearly rejected by these authors, and rightly so, in this reviewer's opinion. As they note, few people (presumably) would be persuaded by, for example, the utilitarian argument that a number of *other* people would benefit from overturning consent conditions for the use of humans as research material. However, just what horrors the utilitarian position could result in could have been more strongly conveyed with more use of historical illustration—the only mention of the Nazi crimes, for instance, is in a sentence which reads in part: '[S]cience cannot be pursued in a moral and ethical vacuum ... the universal condemnation of so-called 'medical research' as pursued in various countries, including Nazi Germany, during times of war supports this view' (p. 6). This hardly provides much information for undergraduate students (presumably a target audience for the book) with little or next to no knowledge of history—a situation which, regrettably, one so often finds with students nowadays. More attention to this side of their subject matter would have more effectively provided counter arguments to those quoted from bio-technologists wanting to do as they pleased, such as 'it is morally wrong as well as politically dangerous to place restrictions on intellectual activities' (p. 57).

Notwithstanding these reservations I would still recommend this volume as a text in science and technology studies courses—indeed for *any* first-year bioscience undergraduates (supplemented, ideally, with a work containing more historical material[4]). It is, as I said, clearly written, and it is also well organized. A first part outlines the technologies discussed, and introduces readers to ethical reasoning; a second part looks at the genetic engineering of micro-organisms, plants, animals and humans in turn; and Part 3 tackles the question, 'Public understanding of genetic engineering: What can education do?' One criticism I would make in the format area (it is meant to be constructive should the publisher eventually consider bringing out an updated edition—already fairly necessary with the recent cloning not only of the ewe 'Dolly', but now calves, genetically altered to produce milk containing human serum albumin[5]) would be of the referencing system. Even though the authors appear to use an author-date system, there are footnote numbers after every date in brackets, and the bibliographic details are given with the footnotes at the end of the book, with the numbers starting at 1 for each chapter. It can thus be annoying looking up the works cited: an alphabetical listing, which the author–date method allows, would make things much easier.

Notes and References

1. For an introduction to the long-standing Anglican commitment to ethical concerns, see John Morgan, 'Is there an Anglican Social Ethic?', in John A. Moses (Ed.), *From Oxford to the Bush: Essays on Catholic Anglicanism in Australia*, Broughton Press, Hall, Australian Capital Territory, 1997.

2. Steven Pinker, *The Language Instinct*, Allen Lane, London, 1994, quoting p. 405.
3. Raymond Gaita, 'Truth and the Idea of a University', *Australian Universities Review*, 40, 2, 1997, pp. 13–18.
4. The reader might like to consult Martin Bridgstock, David Burch, John Forge, John Laurent and Ian Lowe, *Science, Technology and Society: An Introduction*, Ringwood, Victoria, Cambridge University Press, 1998.
5. 'First it was ewe 2, now meet moo 2', *Courier Mail* (Brisbane), 22 January 1998.

John Laurent
Griffith University
Brisbane, Australia

Climbing Mount Improbable

Richard Dawkins

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This book lies squarely in the Darwin/Wallace/Fisher tradition. Ever since the Darwin–Wallace theory was accepted, emphasis has been placed on evolutionary change and on natural selection as the primary agent of that change. Dawkins writes within this framework, although, if we look at a broader view, it is evident that evolutionary change has been so slow that humans were unaware of it until the advent of the industrial revolution, when fossils were unearthed in ways never before contemplated. Now that we can see the 'long view', we know that change has occurred and we perhaps forget to remember that those changes occurred as the dynamic balance between life and its abiotic environment changed very slowly over time. Natural selection is an agent more of stability than of change; it operates as a negative feedback system. Evidence for this is provided by the metaphors recorded by Darwin and Wallace as having assisted them in constructing the principle of natural selection. Wallace[1] writes:

> The action of this principle is exactly like the centrifugal governor of the steam engine, which checks and corrects any irregularities almost before they become evident ... (p. 62)

Darwin cites the picture of a hundred thousand wedges all being forced into a limited surface area[2]. If one goes in further, another must come out. The problem today is that the human wedge, owing to our access to energy supplies never intended for our use, now penetrates that surface and takes up a share never possible in a proper state of nature.

Although Dawkins is mainly concerned with evolutionary change, his last chapter looks at some of the balances operating in nature.

With respect to Fisher, mentioned alongside Darwin and Wallace above, I have to say that I doubt that he would agree with Dawkins claims concerning 'selfish' genes. In his 1918 paper, R. A. Fisher showed the continuous evolution could result from a population of discrete units (genes) giving evolutionary change a statistical basis[3]. This approach is adopted by Dawkins despite his emphasis on single genes. In fact, the example of sickle-celled anaemia discredits the latter approach. A double dose of this gene is lethal, but with a proper balance, the population minimises the impact of malaria. Laurie Garrett, in her book *The Coming Plague, Newly Emerging Diseases in a World Out of Balance*, shows time and time again that nature or natural selection had minimised disease impact prior to technological interference[4].