

tional theories of aging are dealt with in detail, cell senescence is a subtopic in an article generally on apoptosis, and biochemical theories of aging are apparently not mentioned. Epidermal keratinocytes get over 8 pages, hepatocytes get none (although liver cancer gets 11). There is an article on genetic intelligence, a strange combined article on the unconnected subjects of induced mutation and "genetic algorithms," but none on the genetics of intelligence or other psychological traits.

Some topics seem downright eccentric: Why have specific articles for each of chromosomes 1, 9, 10, 11, 14, 15, 16, and 18, taking over 100 pages? It is as if someone wrote down a list of 100 topics in molecular medicine, and then commissioned largely independent articles on them, aimed at the first-year postgraduate student. This is reflected in the lack of an overall index (at least in the volumes so far), which makes the book much less valuable. There is no specific entry for leucine zippers or *BRCA-*

1, for example, so where is the reader to look? Maybe there is an article on the genetics of depression, but not under D or G.

So, if your topic is here (under the title you expect), you are in luck. This encyclopedia is a source of good, detailed background articles on a wide, but not exhaustive, range of topics. Not a tome that an individual is likely to purchase, but it may well be an inspiration for examination setters everywhere, and hence the ultimate final-year undergraduate resource.

Changing the world

***Evolution Isn't What it Used to Be* by Walter Truett Anderson, W.H. Freeman, New York, 1996, pp. 223, \$22.95, (hbk).**

Bernard Dixon

It is not easy to recommend a book that describes the anthropologist Francis Galton as "the original data nerd" and misnames Peter Medawar, one of the towering figures of 20th century biology, as Percy Medawar.

But these are (I suppose) mere blemishes in a book that wins us over by the sheer pace and pithiness of its prose, and by the author's knowledgeable portrayal of a wide range of contemporary scientific advances. The core of Anderson's message is that the concurrence of revolutions in the life and information technologies is changing our world, life and society far more profoundly than we recognize. Other authors have told part of this story, but not with such breadth and brio. Here in par-

ticular, we have a robust endorsement of biotechnology, though one that does not neglect the attendant difficulties and dangers.

However, even visionaries ought to take care over detail. Anderson explains vividly how molecular genetics has been transformed by developments in information processing. He is far less helpful, indeed positively misleading, when he insists that "biotechnology is information" and when he tells us that "the computer has become the metaphor of choice for describing the gene."

Those who attack scientists for "playing God" often talk of them altering the genetic code, and it is surprising to find Anderson committing this same solecism. He and other writers need to realize that the code is simply a code—the triplets of bases that define particular amino acids. It cannot be altered—in contrast to the messages that are written in the code, and which can now be changed to produce proteins different from the original ones.

Although this is not a history of genetics, the author shows undoubted skill in reviewing briefly but lucidly the sweep of ideas and developments, from the work of Aristotle,

Linnaeus, Darwin and Mendel to the Internet and the Human Genome Project. Inevitably, he omits a few key ideas that are as significant today as they were when first introduced. For example, an explanation of linkage would have greatly enhanced the discussion of Thomas Hunt Morgan's work and subsequent mapping of the positions of specific genes on the chromosomes.

The dominant message from Anderson's presentation of the technologies of biology and information is that we are witnessing a shift in the boundary between the given and the made. While most people who have ever lived were dominated by that which simply came to them through nature, tradition, force of circumstance or (some would say) God, the Renaissance saw an exhilarating advance in opportunities for changing the world. "Today," Anderson concludes, "we have possibilities that put the Renaissance to shame."

Whether he is discussing medical science or precision agriculture, exosomatic learning or wildlife management, Anderson projects a commensurate increase in the level of exhilaration. But he does need to watch the details.

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