A Passion for DNA — Genes, Genomes and Society. James D. Watson. Oxford University Press, Oxford. 2000. Pp. 250. Price £18.99, hardback. ISBN 0 19 850697 X.

This book contains a collection of twenty-five essays written by Jim Watson during the thirty years of his directorship and later presidency of the Cold Spring Harbor Laboratory. Most were written for the laboratory's annual report but some appeared in non-scientific publications, such as the New York Times and Time Magazine. Their varied content may be inferred from the five headings under which they are arranged: *Autobiographical Flights*, *Recombinant DNA Controversies*, *Ethos of Science*, *War on Cancer* and *Societal Implications of the Human Genome Project*. There is some repetition but the interest is sustained throughout, not only by the insights provided into molecular biological history but, even more, by the author's opinions, which are always interesting and often provocative.

The autobiographical section provides an insight into his Chicago childhood and describes how, after an early passion for bird watching, he got in on the ground floor of molecular biology through his Ph.D. work on bacteriophage under S. E. Luria. There are also brief biographical sketches of three of his early heroes: Salvador Luria, Al Hershey and Linus Pauling. They are admired by Watson because they all pursued their own paths in life and in this respect he has always followed their example.

Jim Watson is sometimes attacked as a reductionist, and although one may have little sympathy with the confusions of anti-reductionism it must be admitted that he makes himself a rather obvious target. The 'passion for DNA' proclaimed in his title is such that he is inclined to dismiss as a waste of time any branch of biology that does not fairly directly connect with it. Thus, his 1978 essay *In Further Defence of DNA* describes his impatience in the later 1950s, with what he saw as the premature study of embryology. He describes the aspirations of the leading embryologists of the day as 'silly nonsense… from prominent mouths'. Indeed, as a professor at Harvard, he used to, he tells us, give an annual lecture *against* embryology until other faculty members stopped him. One might argue against Watson's position here, that unless the ground had been laid by the pre-DNA biologists, then the DNA people, when they emerged, would never have known what they had to explain.

A related, but to me, more reasonable theme of the book, argued particularly in the 1979 essay *The Necessity for some Academic Aloofness*, is that successful application of science depends on initially disinterested pure research. Crash programmes will come to little if the necessary basic science has not been done. Linked to this is an emphasis on the need for selectivity in research funding; a particular theme of the cancer section. Thus, writing in 1974 (*The Academic Community and Cancer Research*) Watson was very sceptical about the usefulness of establishing large centres for cancer research, at a time when the basic science was not sufficiently advanced to attract the best minds. Later, in 1981, the growing knowledge of tumour viruses, much of it obtained in his own laboratory, made him more optimistic. However, he still advocated stopping the funding of the 'not quite best', even if it meant cutting short some scientific careers in the absence of any certainly that one had made the right judgement. Here, we see Watson as the hard-headed director, a role that might not have been predicted for him by those who knew him in his youth. In the last essay of the cancer series, written in 1990 when the study of oncogenes was achieving such success, he saw the way ahead clearly and became an uninhibited campaigner for cancer funds: 'At long last we may thus have the proper intellectual framework'.

The three-essay section *Recombinant DNA Controversies* records Jim Watson's sustained opposition to the restriction of DNA work in the name of safety. His viewpoint is that there shouldn't be any regulation, or at least none beyond that needed for the safe handling of proved pathogens. He recalls with shame his membership of the group of eleven molecular biologists who, in 1974, called for a moratorium. He also views the 1975 Asilomar conference, which adopted (with Watson as the only dissenter) Sydney Brenner's ingenious formula for calming the waters, as a self-damaging exercise undertaken by 'jackasses'. In 1978 he told the NIH, in a public hearing called to reassess the current guidelines, that it was 'a national disgrace that we should be wasting our time on untestable speculations'. However, at the end of his 1979 essay *The DNA Biohazard Canard* he wrote that he was 'still enough of an optimist to believe that common sense will eventually prevail'. This seems now largely to have happened, as our molecular biological colleagues have to spend far less time than they once did on hazard assessments. Although, whether it would have happened any faster had the molecular biology community stood and fought as Watson wanted is at the least doubtful. I would enjoy reading his comments on the present commotion over the possible dangers of genetically modified foods which are even more indefinite than the scenarios considered at Asilomar. It is no longer possible to oppose, as Watson did in 1979, the appointment of laypersons to advisory or regulatory committees (he thought they would be useless or even disruptive). Today he would have to argue for the inclusion of anyone at all with detailed knowledge of the technology!

One of the longer essays, written in 1973, *The Dissemination of Unpublished Information*, is a thoughtful but somewhat inconclusive consideration of what constitutes sporting conduct in the modern competitive world of science. Watson possibly still feels rather sensitive on this issue, in view of the doubts as to whether all the information that himself and Francis Crick based their DNA model on was legitimately come by. He seems in favour of openness, but with reservations. He is sure that the scientific rat-race will not vanish in the forseeable future, and that 'to think otherwise would be to go back to the utopian ideals of the commune, a concept… whose periodic revival leads always to the discovery that selfishness often wins over altruism'. Well, it didn't seem like that in the old days, but maybe that was because we weren't working on anything really important.

Jim Watson's views on the ethical issues arising from knowledge of the human genome are not exceptional. He thinks that decisions about termination of potentially handicapped foetuses should be left to parents, and that the State should not be at all involved, either by way of advocacy

or prohibition. He is against the cloning of humans, forseeing the burden of expectation that would be placed on someone endowed with the genome of some uniquely talented, or conceited, predecessor.

He despises eugenics as advocated in the past but seems not to rule it out for ever. At the end of the book *Genes and Politics 1997*, under the sub-heading *The Misuse of Genetics by Hitler should not Deny its Use Today*, he writes that 'if scientists find ways to greatly improve human capabilities, there will be no stopping the public from happily seizing them'. This may seem rather at variance with his earlier (1972) opinion, admittedly expressed in a different context, that 'the belief that surrogate mothers and clonal babies are inevitable because science always moves forward… represents a form of laissez-faire nonsense dismally reminiscent of the creed that American business, if left to itself will solve everybody's problems'. Watson's less than total commitment to laissez-faire capitalism is also expressed in a remark made during a 1975 talk (*Science and the American Scene*) to his nieces' girls' school: 'the concept of economic growth, as measured by consumption of material resources, may no longer make sense, and as a nation we may have to strive for happiness in ways that do not automatically demand the further depletion of our heritage from the earth'. I hope we applaud that sentiment, although we cannot expect it to have any effect.

Watson's moral concerns emerge most strongly in his account (*Five Days in Berlin*) of a visit he made to the city in 1997 to give a keynote address to a German-organized Congress of Molecular Medicine. He used the occasion to confront his audience with the crimes and connivances of some German geneticists of their grand-parents' generation under the Nazi regime, and the arguably insufficient ostracism of the guilty parties in the early post-war period. One admires his nerve, but perhaps he went a little too far, especially as from his own account the 1930s geneticists of his own country might have provided as many collaborators as did their German counterparts for a Nazi-type government, had such a regime come to power in America. However, he evidently felt that to speak as he did was a moral imperative. Watson also seems to hold the opinion that if German geneticists were more openly ashamed of their predecessors, the militant German Greens might be less inclined to attack experimental plots of harmless transgenic plants. However, that I doubt.

Jim Watson's career has been a steady ascent; from precocious undergraduate to somewhat outrageous but uniquely successful young scientist, to Harvard professor and then director of the brilliant Cold Spring Harbor Laboratory, and now to scientific elder statesman. Also, of course he collected a Nobel Prize on the way, although he does not dwell on that here. However, as this book makes clear, he has never lost the qualities of the *enfant terrible*, never worried about exciting disagreement or even giving offence. That is what makes his book so readable. One could compile from it a treasury of quotations, any one of which might spark a lively and perhaps useful debate.

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***C. elegans*: A Practical Approach.** Ian A. Hope (ed.). Oxford University Press, Oxford. 1999. Pp. 281. Price £29.95, paperback. ISBN 0 19 963738 5.

In the introduction to this book the editor states that it was intended as an introductory guide aimed at researchers interested in *C. elegans* but currently working outside the field. The editor has admirably fulfilled the remit, producing a book that covers all aspects of this model organism.

The book emphasises what a powerful and important model *C. elegans* is, by illustrating how much is already known about this organism, its natural history, genetics, neurobiology and biochemistry. It covers the latest developments, including the genome project and data available via the web, as well as the conventional genetics, biochemistry and neurobiology of *C. elegans* and some very practical chapters on strain maintenance and electron microscopy. Many methods and protocols are included that describe how to use *C. elegans* in research. The book is written in a readable style with a very useful and detailed index to allow the reader to identify sections of interest quickly.

C. elegans: *A Practical Approach* consists of twelve chapters in total. Each chapter is written clearly and is suitable for Ph.D. students, those who are interested in moving into this field to exploit the wealth of information available on this organism, and those who want to find out what all the fuss is about! The literature cited is up-to-date and includes many relevant URLs that would lead the reader to the web pages of the *C. elegans* sequencing program and to important groups working in this area. Topics covered include: the genome project; genome sequence data base searching and analysis; transformation of *C. elegans*; reverse genetic techniques such as gene inactivation by RNA mediated interference; analysis of phenotypes by Normarski, 4-dimensional, confocal and electron microscopy; neurobiology; approaches for studying gene expression; gene characterisation; biochemistry; conventional genetics with procedures for selfing and crossing; mutagenesis and mutant screening; characterisation of mutants; gene mapping; temperature-shift experiments and mosaic analysis.

For a small, concise book it has a very wide coverage, although where appropriate the authors of the various chapters point the reader to more detailed texts or web sites which may be of interest if further information is required.

Overall, this book provides a concise, state-of-the-art account of the utility of *C. elegans* for studying a wide range of systems. It shows how the range of knowledge and techniques can be applied to address important biological questions and provides an excellent entry for anyone thinking of moving into this area.

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