Betrayers of the Truth concerns itself not only with fraud, but also with other forms of professional misconduct. Indeed the authors do not make much of a distinction between the scholarly sin against God and those against man such as plagiarism, nor do they exclude mere featherbrained credulity, such as emerged so startlingly during the brief reign of Uri Geller and the infant spoon-benders. There are many ways of defrauding one's fellow scientists, the most common being probably the several forms of skulduggery open to referees of papers and grant applications. There are practically no penalties for such abuses;

Thou shalt not steal; an empty feat,
When it's so lucrative to cheat.

Outright fraud is generally fatal if discovered, though even here there are exceptions. In the only case of which I have first-hand knowledge, the perpetrator became a professor and is still hard at it ten years after his first transgressions came to light. So much for the consequences of breaking the tribal taboos. Perhaps just one ritual sacrifice every few years is sufficient to expunge all our accumulated sins.

The question that Broad and Wade do not attempt to answer is how much outright fraud actually retards scientific progress. The answer, I would hazard, is not very much, even if, as they surmise, there is a great deal more of it about than is apparent — in accordance perhaps with the natural law that seven-eighths of nearly everything is invisible. Fraud no doubt reduces the signal-to-noise ratio a little, but its effect is surely trivial compared to that of honest error. However Broad and Wade argue that the incidence of fraud in modern science is a symptom of corruption at the core. It stems, they suggest, from the trend towards large and impersonal research

many quarters on numbers of publications, which to the ignorant remain a more tangible measure of virtue than quality, and you are left with a rich compost in which unhealthy seeds will surely grow. The actions of many of the malefactors in cases of fraud are usually not those of rational men, and in their revelations from the penitent's stool, they speak most often of intolerable stresses applied usually from above.

I would also hold, however, that in a system that ultimately depends on good faith, no one is proof against an ingeniously contrived fraud and a number of blameless and respected scientists have undoubtedly suffered. Nor indeed would one suggest that circumstances can ever altogether exculpate the miscreant. Why, when all is said, did they do it? I think it was Sutton, the bank-robber, who was asked why he was so given to holding up banks; "because" he replied "that's where the money is".

A final reflection: a disproportionate number of the grosser cases of deception described in the book occurred in clinical departments of medical schools, where the exhortations to get ahead by way of publications appear often to be more insistent, and the critical standards consequently lower. There is also, by Broad and Wade's account, a marked reluctance to root out fraud when it occurs and impose penalties to match the offence. And what has happened, you may ask, to the egregious young men, who led their elders by the nose at Harvard, Yale and a clutch of lesser medical schools? Why, they have been sentenced to forfeiture of federal grants and condemned to drink the water of poverty and eat the bread of affliction in medical practice for a while. Dr Johnson said that a man is seldom so harmlessly occupied as when he is making money. Were I a patient, I think I would sooner these enterprising citizens were back in the

Ethics in embryo

R.G. Edwards

Test-Tube Babies: A Guide to Moral Questions, Present Techniques and Future Possibilities.

Edited by William A.W. Walters and Peter Singer.

Oxford University Press: 1982. Pp.165.

Hbk £12.50, \$16.95; pbk £5.95, \$8.95.

HALF the world seems to be opening test-tube baby clinics, with long waiting lists of patients. This procedure offers a good chance of pregnancy for infertile couples — of whom there are so many — while simultaneously raising deep ethical issues on topics such as surrogate mothers or research on human embryos *in vitro*, involving the most fundamental aspects of human conception. Such issues now need a close and impersonal examination, to provide insight on the "value" to be accorded to the human individual at various stages of life. Clear definitions and attitudes are essential: even the use of the term "embryo transfer" needs to be qualified, as it raises the spectre of transferring an embryo from one woman to another.

It is disappointing then that large parts of this book, the result of meetings held in Australia, are too repetitive of earlier discussions. The opening chapter — the inevitable description of the "state of the art" scientifically, which seems to be a must in every book on ethics — is an exact copy of widely-reported events of five and ten years ago in Oldham. Accounts in other chapters of the despair and hope of patients reflect exactly the widely-discussed dilemmas of those who first joined with Lesley Brown and others in a desperate search for their own child. The contributions on ectogenesis, cloning and hybrids similarly offer virtually nothing new that has not already frightened timid ethicists; and the issue of surrogate mothers has been with us since 1970. Today, clarification is needed on values — how they are attained, the sources of ethical and moral decision, the role of the individual scientist or doctor in society, and of the constraints to be imposed on him by professional organizations and legislation.

Some of the chapters dealing with such topics are highly stimulating. I enjoyed Helga Kuhse, on the nature and universality of ethical judgements, their relationship to religious belief and the application of these principles to fertilization *in vitro*. Brian Johnstone draws attention to the moral status of the embryo; the conflict between the life-fulfilling purpose of alleviating infertility and the life-ending action of studying "spare" embryos pushes him close to an absolutist position. In contrast, Kuhse and Singer accord very few rights to the embryo, virtually none. They reject the principle that being a member of the species *Homo sapiens* confers a right to

Harvard Delays in Reporting Fraud

Six months passed before officials made public a confessed case of fraud, and then only after NIH questioned suspicious data

In May 1981, several young researchers at the Harvard Medical School watched in astonishment as one of their colleagues flagrantly concocted data for an experiment. Here was proof, the stunned eyewitnesses later told their superiors, of something they had suspected for months — that their colleague was

May, it was not until NIH questioned results that Harvard discovered the dearth of raw data for the NIH study. At least one faculty member has criticized Harvard for delays and lack of thoroughness. Not the least troubling question in the Darsee episode is why he was allowed to remain in the lab for 6 months.

the hardest working individual that I've ever come in contact with."

In July 1979, Darsee joined Braunschweig, the Hersey Professor of the Theory and Practice of Physic and physician-in-chief of the Peter Bent Brigham and Women's Hospitals. Darsee worked there for the rest of his career, spending

Fraud in Science, 29 January 1982 — a report by William Broad of the case of John Darsee.

groups, in the thrall of robber barons, whose power and rapacity is seldom matched by the intellectual authority needed to run a team of twenty or thirty junior research workers. It is undoubtedly all too common for the leader of such a group to exert relentless pressure on its members to produce or else forfeit his patronage, or, worse, to encourage them to compete with each other for his favours. Add to this the stress that is still laid in

laboratory accumulating inflated academic capital than wondering how they might turn me into an interesting publication. As an excited professor of medicine once said to me in a gratifying moment of self-revelation: "this patient is definitely publishable". □

Walter Gratzer is in the MRC Biophysics Unit, King's College, University of London.

life (a concept they call "speciesism") and support their case by quoting the acceptance of post-coital contraception such as the use of IUDs in modern society.

Carey considers informed consent in relation to the Nuremberg Code, the Declaration of Helsinki and earlier debates on the right of an embryo to give consent to its own beginnings. Discussions on the rights of embryos to consent have always seemed to me to be astonishingly devious, as if embryos can be or are ever asked anything at all, and I was delighted that in his contribution Carey agrees by quoting Fletcher's "Needs are the moral stabilisers, not rights". Carey, however, sadly passes over one of the most difficult questions: how can parents realistically consent to the use of an embryo for research without making massive decisions about embryonic rights? Surely parents can consent only to therapeutic treatments on an embryo; when used for research it is bound to succumb, and parental consent for this implies that the embryo is their material possession, without any right to its own life.

In later chapters of the book, Daniel and Morgan accept the desire of childless couples for children, and stress that the patients are not depersonalized by the procedure. I have long suspected arguments that conception *in vivo* expresses "love", whereas fertilization *in vitro* debases it. The loving demands of infertile couples, one to the other, during fertilization *in vitro* can be far greater than during a chance sexual act leading to conception. I also appreciated Henley's argument, that the small size of the pre-implantation embryo has little relation to any judgement of its "humanness". Rassaby emerges as very liberal and sympathetic on the surrogate mother, a somewhat unusual ethical stance, and Walters braces up to a difficult assignment on cloning, etc., concluding by condemning any potential studies on man-animal hybrids. I fully agree with him.

Some fundamentals of ethical debate are conspicuously absent from this book, many of them concerned with the science and medicine of human conception. Repetition of the absolutist case of the "camel's nose" argument must simply be rejected: undesirable ends are avoided in many areas of human life and can also be avoided with conception *in vitro*. Many aspects of early human embryology also add support to the rejection of absolutism: the genotype of a surprisingly large number of embryos is not finally established at fertilization — as Hassold has recently reminded us with reference to mosaic trisomies — and no one could give any value to an androgenetic embryo destined to result in a molar and perhaps cancerous pregnancy. Worse, however, is a lack in this book of the details of the enormous potential for good in studying early embryos — identifying those with genetic defects, studying differentiation and normal and abnormal growth, teratogenesis, aspects of cancer, even the use of

embryonic stem cells in medicine — the list is almost endless. The enormous research potential for science and medicine, and consequent benefits for ameliorating mental and physical suffering, is for me decisive in debates on the ethical dilemma. The question of children conceived *in vitro* involves one set of ethical issues; the rights or otherwise of embryos *in vitro* raises quite different arguments about the value of research in relation to ethics.

A conflict arises for many of us in contemplating these research studies. Human life must be accepted ethically as being different from animal life — I cannot accept Kuhse and Singer's "speciesism" charge. Equally, we cannot use the small size of a pre-implantation embryo as a moral arbiter, or accept excuses that embryos can be used for research because they would not be there but for *in vitro* fertilization. The fact that some women wear IUDs does not allow us to evade our personal ethical decisions. Nor do concepts such as pain, rationality and consciousness really help in solving our ethical problems on the early embryo, because such parameters take us far into fetal life — weeks, months or even years after fertilization. Such concepts are unhelpful and misleading. The conflict is worst for those who regard a human embryo as different to, say, a mouse embryo, yet accept the need for embryonic research to alleviate disastrous conditions in children or adults. How can notions such as "respect" or "dignity" for an embryo be applied when it will be used for such a need? Decisions about research are made easily by those who believe the embryo has no rights at all, but not by those with reservations.

There is one other significant omission in this book. Where do we find the viewpoints of the Australian scientists and doctors actually involved in the work? They are in the front line — developing the techniques and as a consequence undeniably enmeshed in the ethics. Walters, the co-editor is a gynaecologist, but evidently not involved in the field directly. After their "state of the art" message, the participants in *in vitro* fertilization leave almost all of the ensuing debate to theologians, ethicists and philosophers. How do such practitioners answer Archbishop Little's question in the book: how they gained "the moral right to embark on a procedure which placed them in the predicament of 'destruction or freezing'." Surely, those most clearly involved should have something to contribute, something others cannot? Such inertia inevitably leads to gibes such as "What can be done will be done", and the implication of an uncaring, unfeeling science is reinforced. Research workers must clarify the issues in debate, publicize their ethical attitudes and justify their work to avoid such implications. □

R. G. Edwards, a pioneer in the techniques of *in vitro* fertilization, is Reader in Physiology at the University of Cambridge.

Talk of DNA

F. J. Bøllum

Man Made Life: A Genetic Engineering Primer.

By Jeremy Cherfas

Basil Blackwell/Pantheon: 1982. Pp. 270. Hbk £16, \$15.95; pbk £5.50, \$7.95.

Scientists and non-scientists will be attracted by the title of this book; the subtitle should extend the readership to precocious kindergarteners anticipating the arrival of their first cloning kit from the local molecular biology company. Despite the banner headlines Jeremy Cherfas's appeal to this wide audience will probably depend on individual tastes.

The book presents the cosmos of genetic engineering, beginning with the discovery of DNA structure and the tools required for manipulation of DNA molecules. General procedures for cloning and DNA sequencing are covered, bringing the reader right up to the question of what monster he might like to make. As a word of caution, the social eruption resulting from the regulatory discussions of the mid-1970s is introduced, and then it's back to the *coli* shakers.

Benefits to mankind in the production of rare and important hormones and difficult vaccines, and other biotechnology issues, fill the next three chapters. Benefits received by certain individuals in the form of capital gains are also included for conversational interest. Finally, rethinking the scientific problems already opened wide by recombinant DNA experiments and an outlook for the future brings us to the final page. But who will be there at the end?

Although I believe that recombinant DNA technology is a serious and interesting subject, I had great difficulty getting through this book, perhaps because of the unusual writing style. The story might be performed convincingly on the BBC, but it does not read well. Cherfas's penchant for writing letters to famous scientists and then referencing his own correspondence as documentation of some trivial idea is more irritation than supplementation.

Then there is the choice of subjects for discourse. The author tends to select those topics that he thinks are important because he heard of them from famous scientists. An example is the discussion of restriction enzymes in Chapter 2. While scientific drones may be interested in the general subject of restriction and Type I restriction enzymes, those baby cloners are not. They

Price of Red Deer

In last week's *Nature* (p. 734) the hardback dollar price was omitted in the review of T.H. Clutton-Brock *et al.*'s *Red Deer: Behaviour and Ecology of Two Sexes*. Full prices are hbk £20, \$30; pbk £9.75, \$12.95.