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*Environmental Health Criteria, 46, Guidelines for the Study of Genetic Effects in Human Populations.* 126 pages. Sw.fr. 12. ISBN 92 4 150186 5.

*Environmental Health Criteria, 47. Summary Report on the Evaluation of Short-term Tests for Carcinogens (Collaborative Study on in vitro Tests).* 77 pages. Sw.fr. 9. ISBN 92 4 154187 3.

The International Programme on Chemical Safety, under the sponsorship of WHO, ILO and UNEP, is developing a series of authoritative documents called Environmental Health Criteria. As the number of titles is approaching a half hundred, a change in profile begins to appear, in that instead of treating single substances, recent papers analyse subjects of wider implications and greater complexity. Two of the latest are of interest to geneticists, presenting a *Summary Report on the Evaluation of Short-term Tests for Carcinogens (Collaborative Study on in vitro Tests)*, and *Guidelines for the Study of Genetic Effects in Human Populations*.

Ever since the first demonstration by Auerbach and Robson some forty years ago of the mutagenic effects of chemicals, there has been a dichotomous development of the field, but with internal feedback, between on the one hand the search for 'bigger and better' mutagens and detection systems, and on the other studies of relevance, validity and quantification in the use of a steadily growing number of test systems applied to an ever wider array of chemicals. The need for standardized databases and integrated evaluations have led to handbooks of testing of great value, and to a number of national and international sets of recommendations on what and how to test, mainly to identify and control carcinogens, but also with a view to protect man against heritable genetic damage.

The present *Summary Report* (Environmental Health Criterion 47) presents a condensate of data emanating from a major international collaboration, involving some 60 investigators contributing nearly 90 sets of assays of 8 recognized carcinogens known to be 'difficult' in short-term tests. This large study, organized primarily by Fred De Serres (NIEH) and John Ashby (ICI) is in many ways an extension of earlier efforts aimed at validation and evaluation of test systems. The present report is praiseworthy both in drawing together the essentials of the results of the collaborative effort, and in drawing a number of con-

clusions which are rather firmer and more informative than has been the case in earlier attempts.

The main conclusion, in very few words, are (a) that the Ames test stands up as the most informative single test, (b) that a chromosomal aberration test appears as the most useful additional test, and (c) that cell transformation tests appear as highly promising but with snags remaining. These statements constitute the message as I think regulators and other non-testers would pick it up. This does not give justice to the caveats and complexities presented and discussed in the Summary Report, and even more extensively in the 'big green book' (Ashby *et al.* 1985) of which this Report is the summarizing first chapter. Here is drawn together the essence of a mass of data and useful information which every specialist will want to study in detail.

After this essentially positive review, it seems in order to mention that there are points that may be criticized. Being basically a part of a larger report on testing, the approach and attitude of the report makes it a tester's book on tests, leading to a somewhat introvert quality in the text. More surprisingly, especially for a WHO publication, it seems that the language is not always up to standard. In particular, in a publication aimed at the shifting terrain between science and lawmaking one would expect more carefully formulated statements. The first sentence of the summarizing points of the Conclusion reads: 'Significant differences exist among individual investigators conducting nominally identical assays.' This seems a rather superfluous statement, unless the intended message is that there are important differences in the ways the assays were performed. Other similar examples may be found. One other case that might be mentioned is the use of the word 'genotoxin', which appears to be a non-defined novelty. Toxins are in general referred to in relation to their origin, not their target, and have as such an established meaning. The present adoption in one sense seems practical, but should be defined and defended/explained, perhaps in a section on terminology, which is missing.

Turning next to the Guidelines (Environmental Health Criterion 46), this is the result of the deliberations of an international group of experts, chaired by J. R. Miller (Osaka) and reviews methodology and endpoints useful in the measurement of genetic damage in human populations. With given agents, mutations are to be expected in all living creatures, but the demonstration of induced heritable damage in humans has proved very difficult. The search for methods and criteria which might allow a secure identification and quantification of the effects of a genetic insult has taken great efforts with little yield of hard data. Even in populations exposed to extreme loads of known mutagens, as in Hiroshima and Nagasaki, it has been impossible to demonstrate unequivocally that the following generation is marked by the parental experience.

The report reviews with great care a wide array of

techniques that may be useful in the analysis of mutagenic insults, and covers widely both somatic and genetic end points. Most important is perhaps the general introduction, which outlines requirements and pitfalls in this type of epidemiological research. These are formidable, and the discussion should have a sobering effect on both enthusiastic researchers and worried Doomsday prophets. If effects are so difficult to detect and quantify, it must mean that the species has an inherent stability or self-purgatory capacity of fundamental importance. Which of course does not reduce the urgency of this type of research.

The guidelines do not give recommendations or a ranking list as to the advantages of the various methods. It is pointed out that much is gained by utilizing registration systems already in operation (marriage, birth, handicap, etc.) and so one might have expected emphasis laid on the clinically important endpoints. Perhaps a distinction should be made between efforts aimed at the scientific analysis of genetic stability versus the observation of the *de facto* importance of a given insult. It is interesting that a recent ICPEMC paper (Delehanty *et al.*) reviews a whole series of new approaches to mutation studies in humans with molecular techniques aimed at DNA variation, while concurrently an emerging international collaborative project on genetic effects in children of treated cancer patients plans to utilize the most straightforward genetic endpoint of all, the sentinel phenotype.

One final aspect to ponder. The International Commission for the Protection against Environmental Mutagens and Carcinogens (ICPEMC), with Fred de Serres as vice-chairman, has over the past decade produced dozens of papers in the fields covered by the two reports reviewed here, including *Mutation Epidemiology: Review and Recommendations* from ICPEMC Committee 5, also chaired by J. R. Miller. Yet ICPEMC is not mentioned anywhere in the two reports. Where did we go wrong?

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*Evolution from Molecules to Man*. Edited by D. S. Bendall. Cambridge University Press, Cambridge. 1985, 594 pages. Paperback £12.95. ISBN 0 521 289335.

Evolution continues to be a major inspiration for biological research, still competing with the narrow demands of applied biology and biotechnology for interest and research funds. The centenary of Charles Darwin's death produced many commemorative conferences in 1982, of which probably the best was the one organised, appropriately, by Darwin College Cambridge (UK). A hardback edition of the Conference

papers appeared in 1983, at a price beyond the reach of most pockets, but we can now welcome a paperback edition, otherwise unchanged, whose 594 pages are excellent value at under £13. Its 28 articles are in general solid, very well written and aimed at the more general biologist rather than the evolution expert. As might be expected, they cover a very wide range of topics, in which there is plenty of current activity – both research and argument. These articles are grouped into four main sections, whose headings give a general idea of what the book covers. (1) EVOLUTIONARY HISTORY – a misleading title since the articles are concerned mainly with the evolution of Darwin's thought, with analysis in terms of physical, holistic and dialectical materialism thrown in for good measure. Michael Lerner and his book *Genetic Homeostasis* (1954) get honourable mention in G. E. Allen's article. (2) MOLECULAR AND CELLULAR EVOLUTION deals with aspects of the leading edge of evolution-inspired research, including evolution of gene families and gene clusters, *bricolage* in evolution (an excellent article by François Jacob), three dimensional structures of proteins, and the attempt by the Archaeobacteria to overturn our beliefs about the origin of the Eukaryotes. (3) EVOLUTION OF WHOLE ORGANISMS covers many ongoing arguments on population genetics, ecology, microevolution versus macroevolution, punctuated evolution versus gradualism, why some evolutionary groups have remained apparently unchanged for many millions of years, and so on. (4) EVOLUTION OF SOCIAL BEHAVIOUR contains 7 articles in this speculative if not contentious field which are well worth study, though I will not attempt to summarize them. No doubt the bases of human behaviour will be better understood by the time of the Darwin bicentenary celebrations, though it is confidently predicted that these will be still full of arguments and rival theories. Meanwhile, we can enjoy the speculations in this volume about the origin of taboos against incest, and the ingenious attempts to apply game theory to explain why the British (and a few other nations who have picked up the habit from us) go in for queues rather than for a free-for-all and devil-take-the-hindmost at bus stops and ticket offices (but not, it is claimed, at bars in public houses. This anomaly might have something to do with the bad influence of beer drinking and restricted drinking hours on the British mind).

This book is by no means a complete up-to-date survey of evolutionary knowledge, theory and disagreement; but I found it very readable, stimulating and enjoyably contentious. As an endpiece let me draw the reader's attention to the excellent introduction by Sir Andrew Huxley entitled 'How far will Darwin take us?', in which his last paragraph suggests that only a study of paranormal phenomena such as thought transference might possibly lead to a breakthrough in the mind-body problem of human consciousness. I would have poured scorn on this sug-