

Kasha, Alberte Pullman and Bernard Pullman. There are also various articles on topics such as gene expression and cancer. Thus, Seymour S. Cohen contributes a challenging and stimulating essay on the strategy of chemotherapy of virus diseases and cancer.

I have not mentioned several other papers of interest in this volume, but I must refer to an essay by Albert Szent-Györgyi himself on "Electronic Biology and Cancer". This is a *tour-de-force*, in which the author, on the basis of simple but somewhat primitive physical concepts, engages in a far-reaching speculation on the nature of cancer, and relates it to the action of glyoxalase. Both the

High-altitude peoples

Biology of High-Altitude Peoples. (International Biological Programme, Vol. 14.) Edited by P. T. Baker. Pp. 357. (Cambridge University Press: Cambridge and London, 1978.) £19.50.

A SUBSTANTIAL number of people, though no-one knows exactly how many, live at high altitudes (often defined as above 2,500 m), mainly in South America but also in eastern Africa and Central Asia, including the Himalayas and associated mountain chains. Many are living at or near the limits of human survival. Because of this and because there is little technological capacity to ameliorate one of the dominant environmental factors—low levels of atmospheric oxygen—they afford one of the best groups for analysing the biological components of human adaptation. It was for this reason that they were singled out for special consideration in the Human Adaptability section of the International Biological Programme. This book summarises and synthesises the results of those studies. Most of the work was undertaken by North and South American workers in the Andes, but other investigations were launched in Ethiopia, Nepal and Bhutan, and in the Tien Shan and Pamirs of the Soviet Union.

The approach in this book, however, is, in the main, to present the results by topics such as genetics, growth, work capacity, haematology, nutrition and cold. This has the advantage of providing the reader with a broad view of the processes involved in high altitude adaptation and the components of fitness, but it also emphasises the surprising differences which are to be found between peoples of different geographical region but similar altitude zone. There is certainly no single blueprint for altitude survival and it would seem that many local factors including

theory and experimental support are at present sketchy, but the essay may possibly stimulate others to further explore the role of free radicals in biology, and particularly cancer research, with adequate methods.

The book is well produced, contains many articles of great scientific interest, will give a lot of stimulus and enjoyment, and will occasionally produce some irritation in the critical reader.

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ancestry and history are involved in determining the biology of mountain peoples.

Individual physiological acclimatisation to reduced availability of oxygen is a well demonstrated and functionally important aspect of high altitude living, but there is also much suggestive evidence that indigenous highlanders are better adapted to their environment than fully acclimatised lowlanders. Regrettably no specific genetic system has yet been identified which can account for this, and some of the phenomena may be due to developmental processes rather than genetic ones. Nevertheless, there would seem to be heritable components to some of the morphological, biochemical and haematological characters which distinguish at least Andean highlanders, and it seems likely that natural selection has played an important role in producing their adaptations.

All the contributions in this book are good and it may be invidious to single out any for special mention. But I did find the ones on fertility and early growth by E. J. Clegg and on childhood growth by A. R. Frisancho particularly useful in understanding how high altitude phenotypes develop. The IBP provided a great impetus to comparative growth studies. The book also provides one of the few accessible accounts of physiological work that Soviet scientists have been undertaking in Tien Shan, and the final chapter by the Editor on adaptive fitness is a thoughtful and penetrating discussion of how demographic data can be used to gain holistic insights of the nature of population adaptation.

The book, which is attractively produced, can be most strongly recommended. It is a fitting tribute to the IBP and will for many a year be the standard source on the human biology of high-altitude peoples.

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Electron spin resonance from the ground up

Theoretical Foundations of Electron Spin Resonance. By John Harriman. Pp. 397. (Academic: New York and London, 1978.) \$39; £25.35.

THIS is electron spin resonance from the ground up, which, as far as we need be concerned, is the Dirac equation. Dr Harriman has written a text which is unashamedly theoretical, and in which the thrust of the development is to start at the beginning, to go on to the formulation of the spin-hamiltonian, and then to end with the interpretation of the parameters in the spin-hamiltonian in terms of the electronic structures of the species under study. The species he has in mind are inorganic and organic free radicals in which orbital effects are largely quenched; in other words, this is more a book for theoretical chemists than for physicists—hence the word *Spin* in the title. The text is confined to isolated, stationary species; relaxation processes are not considered.

The treatment is most welcome. There is much to be said for a complete, thorough, detailed, sustained and largely uncompromising survey of this field, and the place it takes in the literature has not previously been occupied by any of the other books on electron spin resonance. Even workers in the field who have no pretensions as theoreticians ought to spend some time reading the helpful summaries at the end of each section.

One of the attractions of spin resonance for the theoretician is that the central object of study, the electron spin, is well defined and has only two energy states; and even in the next order of approximation (taking account of the effects due to nuclei) the number of levels is small. The energy levels can therefore be treated in great detail, but to do so effectively the whole bank of operator techniques has to be drawn on. In other words, the problems that not only can be solved but, on account of the sensitivity of the technique, have to be solved, can be tackled fairly easily by sufficiently sophisticated methods.

Electron spin resonance provides good, tractable problems for the theoretician, and they are problems that the experimentalist needs answered. All this comes out very clearly from Dr Harriman's extended, thorough treatment of the subject.

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