

## Attacking viruses

*Selective Inhibitors of Viral Functions.* Edited by William A. Carter, Pp. 376. (CRC: Cleveland, Ohio, 1973.) \$39.95.

It is the opinion of many animal virologists that, with one or two isolated exceptions, the successful treatment of virus diseases with specific anti-viral drugs is a subject which falls into the pipe-dream category. Optimists can be found, however, and the editor of this multi-author work clearly defines himself as one in his introductory remarks. He has assembled here a collection of reviews concerned with both laboratory and clinical aspects of specific anti-viral agents together with accounts of host reactions to viral infections and of immunisation against viral infections.

The natural recovery process from acute viral infections is dealt with comprehensively and concisely by W. E. Stewart. He clearly points out that it is still difficult to assess the relative importance of circulating antibody, cell-mediated immunity, interferon, and non-specific defence mechanisms. In the chapter on immunisation against viral infection, L. W. Marshall briefly discusses theoretical aspects and describes the viral vaccines and passive immunisation procedures currently used in human medicine.

A speculative article "Active Sites of the Animal Viruses: Potential Sites of Specific Chemotherapeutic Attack" by W. M. Mitchell follows. I feel that this author's enthusiasm has rather carried him away from reality, and that non-specialist readers might imagine, for example, that the synthesis of biologically active human interferon by solid-phase methods was just around the corner. This impression, is, however, corrected by a chapter on interferon structure by R. Weil and F. Dorner. Other chapters on the effects of interferon, the molecular requirements for interferon induction, interferon induction by polynucleotides and non-nucleotide interferon inducers are contributed by E. De Clerq and W. E. Stewart, M. D. Johnston and D. C. Burke, A. K. Field and E. De Clerq respectively. It is apparent that one of the most important aims of interferon research—its purification to homogeneity—is proving an intractable problem.

The remainder of the book is concerned largely with synthetic and semi-synthetic anti-viral compounds and antibiotics. Amantadine hydrochloride and related compounds, arabinosyl nucleosides and nucleotides, and halogenated pyrimidines are discussed, largely in a clinical context, by C. E. Hoffmann, L. T. Chien, F. M. Schabel and C. A. Alford, and J. Sugar and H. E. Kaufman, and comprehensive accounts of the anti-viral properties of thiosemicarbazones, guanidine

dine and 2-( $\alpha$  hydroxybenzyl) benzimidazole, rifamycin SV derivatives, and streptoviricins are given by W. Levinson, L. A. Caliguiri and I. Tamm, B. Moss, and D. M. Byrd and W. Carter. The book concludes with a short article by P. M. Pitha on the possibility of inhibiting virus growth by the use of viral genome analogues.

The quality of the contributions in this volume is generally high, although one or two early chapters show evidence of sloppy proof reading and reference checking. The book can be recommended as an up to date account of its subject, the comprehensive bibliographies which conclude most chapters being particularly useful.

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## Food for ruminants

*Chemistry and Biochemistry of Herbage.* Edited by G. W. Butler and R. W. Bailey. Vol. 1: pp. xx+639; vol. 2: pp. xiii+455; vol. 3: pp. xii+295. (Academic: London and New York, October 1973 and January 1974.) Vol. 1: £12; \$36; vol. 2: £8; \$25; vol. 3: £6; \$17.

THESE volumes provide for the first time a comprehensive source of information on the chemistry and biochemistry of herbage defined as plant material excluding seeds or roots grown for feeding herbivorous animals.

Chapters 1-11 deal mainly with organic constituents of plants, free and bound amino acids, amines and ureides; proteins and nucleic acids; non-structural carbohydrates; structural carbohydrates; lipids; plant phenolics; lignin; alkaloids; cyanogenetic glycosides and glucosinolates; chlorophyll, carotenoid pigments and sterols; forage saponins. Most chapters follow a similar pattern describing chemical nature, classification, extraction from tissues and estimation of these compounds, amounts present in plants and their component parts, biosynthesis and amounts of components, for example amino acids in proteins and fatty acids in lipids.

Perhaps it would have been more logical to include chapters 1 and 2 of volume 2 on vitamins, and water in herbage, in volume 1, and chapters 12 and 13 in volume 1 on mineral composition of herbage and nutritional aspects of soil ingestion by grazing animals in volume 2, along with four chapters on mineral absorption and composition of herbage, mineral biochemistry of herbage, organic acids and their role in ion uptake, and cycling of minerals in ecosystems.

Commendably, a good deal of attention has been given to linking treatment of subject matter, for example in the above chapters on minerals, and in chapters on physiology of light utilisation

by swards, growth senescence and stress, and organic reserves and regrowth. Further chapters in volume 2 deal with the biochemistry of photosynthesis, symbiotic nitrogen fixation by legumes, the nitrogen cycle of pasture ecosystems and genetic variation in herbage constituents, this last chapter making a fitting end to volume 2 and prelude to volume 3, in its consideration of problems encountered in breeding improved varieties and emphasis on the need to evaluate results against animal performance.

The more applied chapters of volume 3 deal with conservation of herbage as hay and silage, leaf protein as an animal and human foodstuff, digestion of pastures by ruminants and other herbivores, the feeding value of herbage and its evaluation by laboratory methods, and limitation to the productivity of the herbage-fed ruminant that arise from diet, including the effects of toxic components and metabolic diseases.

Advanced students, teachers and research workers will find here an invaluable source of information, for example on assessment of methods of extraction of compounds from tissues, and on areas where, because of paucity of information on herbage plants, recourse has been made to non-herbage tissues, thus pointing to the need for further research. Examples of this are the description of biosynthesis of lipid components in spinach, chorella and bacteria, detailed studies of isolated cellulose from wood and commercial fibres, the need to assume that *in vivo* formation and inter-conversion of carbohydrates in leaves and stems are probably similar to those in seeds and tubers, and the belief that protein synthesis in plant cells is essentially similar to the mechanism worked out for bacteria and mammalian cells. Attention is constantly focused on the need for further research, for example, in comparing information available on temperate and tropical herbage and in the search for methods of measuring the nutritive value of herbage.

An attractive feature of the work is that agronomists and plant breeders will find useful biochemical treatment of several subjects such as ensilage and ruminant digestion, biochemists will find limitless avenues for research, while the ruminant, the ultimate beneficiary, is frequently brought into the picture. A worthwhile attempt, attended by considerable success, has been made to bridge the all-too-wide gap which frequently separates pure biochemists and workers in agricultural science.

On the whole the work is readable and, bearing in mind the diverse nature of topics covered in what are, for the most part, review chapters with appropriate lists of references, a reasonably even standard of treatment is achieved.