the problems of germination, e.g. the chapter on control of dormancy. However the chapter on perspective of dormancy does disappoint in this respect. A number of minor blemishes can be noted. Auxin is not mentioned, either in relation to ethylene or in relation to its metabolism. It is also claimed that isocitric lyase is absent from lettuce seed but there is convincing evidence to the contrary. In a volume of such breadth and coverage such minor slips are almost inevitable, and in no way detract from its value. The volume contains a wealth of information most of which is extremely difficult to get at elsewhere. It is well indexed with separate species, author and general indices, well up-to-date, with literature covered more or less to 1980, although I have the impression that it was rather longer in coming out than the authors would have wished. This is not a text for undergraduates but I recommend this volume warmly to all those interested in the topic of seeds and as a must for all researchers in the field. There are not too many books around in this area and this is certainly a very good one. The price is hardly cheap, but considering the increased number of pages, and 4 years of inflation, the increase in price is reasonable (cf. to Vol. I).

The Institute of Life Sciences,
The Hebrew University of Jerusalem,
Israel

A. M. MAYER

Cyanide in Biology: edited by B. VENNESLAND, E. E. CONN, C. J. KNOWLES, J. WESTLEY and F. WISSING. Academic Press, London. 1981. 541 pp., £22.

This volume has grown from a workshop on 'HCN Metabolism' held in August 1978 at the University of Kent. The range of topics has been expanded to include authors not present at the meeting and, in addition, all authors have been encouraged to bring their material up to date as of June 1980. The volume includes 35 chapters contained within 541 pages of text and, although the editors apologise that some people may be disappointed in the choice of topics, it is obvious that they have attempted to make a comprehensive volume on *Cyanide in Biology*.

Early toxicological studies dating from the eighteenth century are reviewed in the opening chapter and they set the scene for the well known toxic effects of cyanide. In common with other toxic natural products, cyanide has also featured in medicine and even though it was removed from the 1948 edition of the *British Pharmacopoeia*, it still features as an expectorant in some plant based medicines. The pharmacology of cyanide and its role as an inhibitor of enzymes are reviewed in some detail.

Cyanogenesis, i.e. the ability of plants to produce hydrogen cyanide, is exhibited by approximately 2000 species of higher plants as well as by numerous microorganisms and some animals. Therefore it is particularly interesting to note the distribution of the various amino acid-derived cyanogenic glycosides and also lipids within various plant families and to read about the isolation procedures and methods utilized for their structure elucidation. A number of cyanide-containing plants, including cassava, yams, sorghum, millets, maize, apricots, peaches and almonds, are edible plants which form part of the diet of humans and/or other animals, thus they are potentially hazardous and may result in toxicities or even in death. Cassava is the major cyanide-containing food crop and it is disturbing to read that application of an enzymic assay to determine both free and bound cyanide has indicated that residual bound cyanide concentrations are higher in some foodstuffs than previous studies suggested.

The biosynthesis of cyanogenic glycosides from amino acids via *N*-hydroxylation and then to aldoxime, nitrile and hydroxynitrile is discussed in some detail. Apparently only one non-protein amino acid and five of the protein amino acids serve as direct precursors whereas other amino acids such as alanine and tryptophan do not have what it takes to become cyanogenic. The biosynthetic routes to cyanogenic glycosides, glucosinolates, hydroxamates and nitro compounds all share common intermediates and hence these four classes of secondary metabolites may be derived from a common pathway.

The metabolism of cyanide by bacteria is also reviewed and despite the considerable work which has been done in this area, there are still many questions which are left unanswered. Specific chapters deal with aspects of the role of cyanide in species of *Pseudomonas* and *Chromobacterium*, microalgae, fungal pathogens of cyanogenic plants, and arthropods. Nitrilase enzymes have been discovered comparatively recently in higher plants, fungi and bacteria and the proposal is made that a significant number of these enzymes still await discovery. Cyanide-resistant respiration in bacteria and in eukaryotic cells form the topics of two separate chapters.

The concluding chapters are concerned with the problem of cyanide contaminating fresh water, the genetic control of plant cyanogenesis and the role of hydrogen cyanide in prebiotic evolution. It is claimed that the origin of terrestrial life was very closely dependent on the synthetic capabilities of hydrogen cyanide and its derivatives. Whether or not this is the case is outside the terrestrial experience of this reviewer but what is most obvious from this volume is that cyanide, which has such a notorious reputation, has far more implications in biology than its ability to end life. I believe that the cyanide experts will want this book on their library shelves because of the detailed contents within the space of a single volume. However, the wide ranging approach to a narrow topic means that it contains a wealth of information which should be of interest to all scientists concerned with living organisms.

The School of Pharmacy,
University of London

J. DAVID PHILLIPSON