

useful summary of 'Plant breeding: the state of the art', but several other contributors add to and extend his observations. Finally, the book is rounded off by a summary of the main conclusions arising from the conference (R. L. Phillips) and by a collection of presentations from a 'Roundtable discussion' of research priorities from members of academic and industrial institutions. These contributions all make very valuable additions to the book.

In summary, I found this book to contain many stimulating papers, representing a balanced sample of research topics within the framework specified by the title. I believe that many of the conclusions which emerge from this book will be of value to plant breeders and cell biologists for several years to come, even though the details of the molecular genetics papers will soon be outdated.

STEVEN M. SMITH
*Department of Botany,
University of Edinburgh*

Seed Proteins: Biochemistry, Genetics, Nutritive Value. Edited by W. GOTTSCHALK and H. P. MÜLLER. Institut für Genetik der Universität Bonn, Bonn, West Germany. Dfl. 250.00 (approx. US \$109.00). 542 pp. ISBN 90 247 2789 8.

Over the past few years, rapid progress has been made in our understanding of the biochemistry and genetics of seed proteins. In view of the world-wide nutritional importance of these proteins, it is necessary to have a sound knowledge of their structure and genetics, and of their synthesis and its regulation if optimum use is to be made of this important food resource.

Before the next stage of research, which is likely to involve a genetic engineering approach to the problem of improving protein quality, it would be useful to summarize our current state of knowledge. I therefore welcome this text, which deals with recent progress reported in separate articles, each one by an expert in his field. Generally, this book is successful in its coverage of the range of work carried out, giving particularly good coverage of the information derived from studies using electrophoresis. Its value as a reference book is seriously diminished, however, by the lack of a detailed subject index. I also found the frequency of spelling errors to be irritatingly high. The errors are spread unevenly over the articles and it appears that too much editing responsibility has been delegated to individual authors. Spelling errors were not confined to the main body of the text, but were also present in article titles ('Evolutionanary', page 481). Occasionally the English construction is clumsy; again this occurs only in certain chapters.

These blemishes apart, many of the articles are very readable and informative. The reader is introduced to world crop and agronomy problems in the opening chapters with the work on the *opaque-2* mutation in maize given as an example of the kind of problems encountered in what appears at first to be a straightforward breeding objective. This is followed by a valuable technical chapter on different methods for the characterization of proteins by electrophoresis. This section might usefully have been extended to include identification of seed lectins and proteinase inhibitors as a prelude to both Doll's chapter on selection for lysine-rich soluble proteins and the articles on legume proteins.

The chapters on the genetics and biochemistry of wheat, barley, rice and maize proteins comprise a main part of the book. The combined length of these sections reflects the considerable research effort involved. Failure to date of all attempts to obtain high-lysine mutants of wheat is offset by the excellent progress made in relating specific glutelins and gliadin wheat to quality (e.g. the visco-elastic properties of bread dough are due to specific proteins). In the article on barley, Shewry and Mifin describe the elegant studies

on variant forms of hordeins, including the genetic analysis which showed that these proteins are coded for by two loci, hordein 1 and hordein 2 positioned approximately eight units apart on the short arm of chromosome 5 in barley. Some of the initial work on the *in vitro* synthesis of hordeins is also described. This aspect may have merited some expansion, as different cereal research groups have been successful in cloning plasmids with inserted DNA sequences that code for storage proteins.

Attempts to improve protein quality by mutation are described in several articles. Mutants derived so far appear to have some yield disadvantage, e.g. reduced seed size in addition to any improvement in quality. They also divide into types that may improve in yield characteristics by the introduction of modifier genes, and other mutants in which the yield disadvantage appears to be a pleiotropic effect of the quality improvement, e.g. the Risø mutants, which have a high grain lysine content but a strong tendency to produce shrivelled grains. Doll suggests that increases in lysine content should be sought by combining variants for the relatively lysine-rich soluble proteins, thus attempting to avoid any reduction in the storage protein fraction. Whichever breeding method is successful, it has become clear that improvement in protein quality is not a simple breeding objective.

In the chapters on legume seed proteins it is pointed out that comparisons made of storage proteins in legumes are complicated by the difficulties inherent in extracting the proteins efficiently. It is also evident that a more methodical system for naming the protein fractions currently known as legumin, vicilin, phaseolin, etc. would help in making the appropriate comparisons. A few summarizing diagrams of these protein fractions separated on SDS-PAGE might have been helpful here, especially in tracing evolutionary relationships. The book also includes sections on the minor cereals and legumes and finishes with an interesting chapter on the nutritive value of seed proteins.

The different areas of research drawn together in this text provide the reader with sound background information on the seed proteins and also indicate promising lines of future work, e.g. gene cloning, which should pave the way for further research.

M. J. ALLISON
*Scottish Crop Research Institute,
 Pentlandsfield,
 Roslin,
 Midlothian*

The Arctic Skua, A Study of the Ecology and Evolution of a Seabird. By PETER O'DONALD. Cambridge University Press, Cambridge, England CB2 1RP (1983). 324 pages, £25.00. ISBN 0 521 23581 2.

The central tenet of the neo-Darwinian synthesis is that evolution proceeds by a bias in contribution of numbers of offspring to future generations, by parents of the present generation. Those individuals which contribute proportionately larger numbers of descendants are deemed the most 'fit'; if variation in fitness is associated with the presence or absence of a particular gene, then natural selection operates on that gene. For this theory of evolution to be predictive, one needs to assign selection coefficients to the genes segregating in the population of interest. This is clearly a mammoth task, both conceptually and practically, for not only does the fitness of an individual depend on its entire assemblage of genes, rather than single loci, but fitness also varies among individuals not solely because of differences among them in genotype, but also because of the different environments they inhabit. ('Environment' in this context is the geneticist's shorthand for those factors which comprise the entire field of ecology!) Empirical measurements of fitness associated with alternate alleles at even a single locus are thus exceedingly difficult to obtain, and are for the most part confined to special