on the evolution of plants and animals, but it was difficult to relate their treatment to the genetics. Since then a growing number of texts have appeared which relate the two aspects of the subject in a way suitable for university courses, and introduce the relevant molecular biology and population dynamics as well. Hartl's 1980 Principles of Population Genetics was a distinguished member of this group. Although the present volume has the same title and is described on the cover as a second edition, it has gained another author, four more chapters and an additional two hundred pages and is considerably reorganized. The result is excellent.

The treatment starts with Darwinian evolution in Mendelian populations. Observations of genetic variability and the techniques used to observe it are covered, and the basic methods of recording and describing gene frequency. This is followed by chapters on genetic drift, on mutation and neutral theory, natural selection, inbreeding and population subdivision to provide a sound coverage of the main features of the subject. The book ends with three chapters respectively on molecular population genetics, evolutionary genetics of quantitative characters and ecological genetics and speciation. An up-to-date coverage is presented, from restriction sites to adaptationist just-so stories; references certainly take us to 1987 and possibly later. Each chapter ends with a set of problems. Throughout, there is emphasis on methods of analysis, ideal for a rigorous and extensive course. Consistent with this approach, there are many graphs and diagrams of zymograms, sequences and equipment, including the inebriometer, a device for measuring knockdown resistance to ethanol fumes. There are few pictures of organisms, I only counted four, but they include Drosophila and *Biston betularia* as well as *E. coli*. As the authors say in their preface, this is an exciting time for population genetics because it is becoming united with molecular biology. The book provides a feeling of the current strength of the subject and the techniques upon which it rests. I recommend it strongly. It is too advanced for the undergraduate students I teach, although intended by the authors for third and fourth year undergraduates in American universities as well as for graduate students. As a text for research students and academics working in, or wishing to know more about, the subject it is ideal.

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Parental line breeding and selection in potato breeding. K. M. Louwes, H. A. J. M. Toussaint and L. M. W. Dellaert (compilers). Centre for Agricultural Publishing and Documentation, Pudoc, Wageningen, Netherlands 1989. Pp. 210. Price: not yet listed. ISBN 90 220 0981 5.

The breeding section of the European Association for Potato Research and the potato section of the European Plant Breeders Association (EUCARPIA) hold joint meetings every 2-3 years. This book is a compilation of the 31 papers and 18 posters presented at the meeting held at Wageningen in the Netherlands in December 1988.

Papers are printed as presented so there are the inevitable variations in typefaces, spelling and terminology which one must expect when contributions are received from most European countries and from as far afield as Wisconsin, Siberia and Bangladesh.

The intended audience for the book is "scientists involved in potato research, potato breeders and students of agricultural universities". The first two categories are clearly appropriate as they are the main contributors and participants at these conferences. However, as the papers are often highly specialised, a student is likely to follow only those subjects which he has covered in research projects.

The papers are divided into four sections, Combining Ability, Parental Choice, Asexual Gene Transfer and Parental Line Breeding. Only the first and last of these sections kept to the theme of the conference but the papers in the other sections are no less interesting for that. The poster summaries cover a wide variety of related topics.

The first section on Biometrics illustrates the diversity of approach between the highly mathematical papers of Tai and Boudec and the progeny testing methods based on simple means and variances presented here by Brown, and later by Mackay. Also included in this section is a paper on the application of a mathematical model, developed for human epidemiology, to fungal leaf diseases. The model appears to fit well but is likely to be too complex for use in breeding programmes.

The second section dealing with parental choice, covers some interesting papers on physiology and nematode resistance; the section title of Parental Choice is misleading as already indicated. The paper by Colon *et al.* discusses the transfer of the low-temperature, non-sweetening character from the wild species *Solanum goniocalyx*; it is interesting to note that several commercial varieties, including Brodick from the SCRI in Scotland, have achieved the same aim using existing *S. tuberosum* germplasm. Even in the restricted germplasm base of *S. tuberosum*, it is surprising what you can find if you look hard enough!

Section 3 on Asexual Gene Transfer covers the most rapidly evolving field in potato breeding. Fusion continues to make progress and is highly desirable as a means of combining diploids into a tetraploid "final product" but is bedevilled by problems of chromosome number instability. The transformation papers contain two particularly interesting contributions; Willmitzer *et al.* on tissue specific gene expression and van den Elzen on its commercial application. The latter paper was received with great interest at the conference as it showed the commercial relevance of this work but unfortunately is only reproduced here in short, summary form.

The final section covered Parental Breeding at the Tetraploid and Diploid levels. The tetraploid papers provide an interesting comparison between the aims and

methods of programmes in different countries. Zimnoch-Guzowska and Dziewonska provide an honest review of the trials and tribulations of diploid breeding. "The optimistic picture of advantages coming from diploid potato breeding is spoiled by difficulties . . . due to the characteristics of diploids and . . . the barriers of interspecific crossability."

Potato breeding continues to fascinate and infuriate all those involved and this is a useful collection of papers covering most of the currently active avenues of research.

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Genetic resources of *Phaseolus* beans. P. Gepts (ed.). Kluwer Academic Publishers, Dordrecht, Boston and London. 1988. Pp. xiii+613. Price £76.50. ISBN 90 247 3685 4.

The importance of *Phaseolus* beans lies in their contribution to human diets in terms of their protein content. They are ancient cultigens of the Americas, and are today represented by four principal species, namely the common bean (*Phaseolus vulgaris*), the runner bean (*P. coccineus*), the lima bean (*P. lunatus*) and the tepary bean (*P. acutifolius*), and one or two minor cultivated species. However, *P. vulgaris* is by far the most important species world wide, and this is reflected in the 11 chapters (out of 23) which are devoted to this species in this book.

The editor has compiled a series of up-to-date reviews on the genetic resources of *Phaseolus* beans. Twenty-nine authors have contributed chapters which are divided in five sections; I. *Phaseolus* germplasm exploration and maintenance (six chapters); II. Domestication and evolution of *Phaseolus* spp. with special reference to *P. vulgaris* (five chapters); III. Genetics of *P. vulgaris* (four chapters); IV. Genetic resources, domestication and evolution of other *Phaseolus* species (three chapters); and V. utilization of *Phaseolus* genetic resources (five chapters).

In the first section, the chapter by D. G. Debouck is particularly interesting since it combines both theoretical and practical aspects of collecting *Phaseolus* beans, often based on the author's own experiences in Mexico and Central America. The second chapter by E. E. Roos outlines seed storage methodologies appropriate for beans, but much of the information is not new. Since bean seeds are orthodox, they can be stored for long periods at low temperatures and low moisture content, but may be subject to imbibition damage. In terms of genetic conservation the genetic consequences of seed regeneration following storage would merit much more attention, since this aspect is rarely discussed in any detail.

Data management of bean genetic resources, the organization of the world collection of *Phaseolus* at the International Center for Tropical Agriculture (CIAT) in Colombia, the germplasm collection of wild species and forms in the tribe Phaseolae Sub-tribe Phaseolinae, which is held at Gembloux in Belgium, and the international *Phaseolus* germplasm network, are the subjects of the other chapters in this section. In the chapter on a bean germplasm network, Judith Lyman-Snow states that amongst the advantages of the network are the rapid dissemination of research results through informal contacts and publications, and the flexibility to meet current research needs without major additional investments.

The first chapter in Section II is a review by L. Kaplan and L. N. Kaplan of the history of bean cultivation in the Americas, which goes back at least 5000 years. They also give an interesting comparative account of the domestication and early agriculture of *Phaseolus* beans and maize in the New World and those of legumes and cereals in the Old World. A comprehensive discussion by J. Smartt of the morphological, physiological and biochemical changes in *Phaseolus* beans under domestication indicates why these species have been so successful as crop plants, especially *P. vulgaris*. There are also two chapters on the wild ancestors of *P. vulgaris* in Meso-America and in South America.

In an interesting chapter, Gepts has reviewed the use of phaseolin, the major seed storage protein, as a marker to show that *P. vulgaris* was domesticated repeatedly throughout the range of its wild relative, and such studies have also provided a basis for the understanding of the dissemination of *Phaseolus* from Mexico and from the Andes around the world.

The first chapter of Section III by C. L. A. Leakey is the longest in the book, and reviews the extensive data concerning traits controlled by major genes, as genotypic and phenotypic markers in the common beam. In another chapter, by M. J. Bassett, linkage mapping of marker genes is described in common bean, which is still in a rudimentary state compared to maize, tomato and pea amongst other crops, and only 31 genes have been quantitatively mapped. Evidence on other linkage groups needs further verification. The genetic structure of bean landraces in Malawi, Meso-America and the Andes is described in two further chapters using multivariate analyses of morphological and phaseolin data.

The three chapters of Section IV are concerned with the genetic resources of *P. lunatus* (lima bean), *P. acutifolius* (tepary bean) and *P. coccineus* (runner bean), each of which has only limited importance in agriculture compared with the common bean. Nevertheless, these species deserve attention through exploitation in their own right, as well as sources of genetic diversity for the improvement of the common bean.

Utilization of genetic resources must be one of the principal justifications for their collection and conservation. The five chapters of Section V cover the utilization of *Phaseolus* genetic resources in general, and more specifically bean breeding in Brazil, wide crossing between *P. vulgaris* and *P. acutifolius*, selection methods in common bean breeding, the transfer of quantitative traits in wide crosses with *P. vulgaris*, and finally the utilization of genetic resources for commercial bean cultivars in the U.S.A. In terms of wide crossing, there are many problems between *Phaseolus* species, although