

take-home lessons learnt in the rather disappointing human malaria vaccine trials recently carried out [Herrington *et al.* (1987), *Nature* **328**, 257–259] and a lot of effort is now being exerted to define these epitopes within candidate vaccine antigens. The importance of T-cell-mediated immunity in many diseases is well documented in this book and elsewhere, and the advances in peptide synthesis over recent years have allowed peptide chemists to make a substantial contribution to defining both T-cell and B-cell epitopes. Richard Houghton, for example, has developed an automated peptide synthesizer which allows the production of 100 peptides within 2–3 weeks, allowing the systematic study of amino-acid composition upon certain antibody–antigen interactions.

A novel approach to vaccination using anti-idiotypic antibodies is presented by Finberg and Ertl in this volume. Immunization with antibodies generated against specific T-cell clones from virus-infected animals was shown to result in both cytolytic and helper T-cell responses, and also to generate a virus-specific antibody response. This method precludes the need for the often expensive production and purification of a recombinant antigen and is a very exciting development.

Much work to date has gone into defining the protective antigens of various infectious diseases and we are now entering an era where we need to define the optimal delivery system of these antigens for the generation of immunity. The virologists have shown the way in this field and the emphasis, as illustrated in this volume, is moving away from the use of synthetic peptides and purified recombinant proteins to the use of viral vectors, which directly express the gene of the candidate antigen. Of these vectors, recombinant vaccinia viruses have received the most experimental attention, though for obvious reasons these could not be employed on human populations. The successful results obtained using vaccinia vectors in animal model systems have, however, pointed the way for modifications of this approach, and work is presented which utilised other viruses such as adenoviruses, herpes simplex virus and baculovirus as novel antigen delivery systems. The well publicised work of Jeffrey Almond and his colleagues at Reading, who have recently shown that the safest of the attenuated poliovirus strains may be a suitable vector for vaccinations [Burke *et al.* (1988), *Nature* **332**, 81–82] is one good illustration of the power of this approach. In addition to viral vectors, bacterial strains of *E. coli* and attenuated *Salmonella* have been constructed which can express foreign antigens on their cell surfaces.

One advantage of using vectors such as those mentioned above is, of course, a lessening of the requirement for adjuvant of which very few are applicable for human use. However, novel adjuvants are still required for human immunisations with

peptide and purified recombinant subunit vaccines. Muramyl dipeptide analogues have proved promising, but it is likely that in future more attention will be paid to ‘biological’ activators of the immune system such as γ -Interferon and Interleukin-2. Work reporting the successful expression of both these compounds in recombinant vaccinia viruses is presented in *Vaccines* 87.

Ginsberg quite rightly states at the end of this volume that developing vaccines and understanding the use of vaccines require a thorough knowledge of the pathogenesis of infection and the basic immunologic events that accompany infection and development of disease. The move to ‘biological’ antigen delivery systems such as viruses and the possibility of the concurrent expression of ‘biological’ activators of the immune system such as γ -Interferon and Interleukin-2 reflect the growth of knowledge in this area. It will be interesting to follow these developments in later editions of this most useful series of Cold Spring Harbor Conferences.

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Population Genetics and Fishery Management. Edited by N. RYMAN and F. UTTER. Seattle, WA: University of Washington Press. 1987. 418pp. Cloth \$35.00, ISBN 0 295 96435 9. Paper \$17.00, ISBN 0 295 96436 7.

Nils Ryman and Fred Utter are to be commended for assembling a timely collection of papers in *Population Genetics and Fishery Management*. The purpose of the book is to demonstrate the application of principles in population genetics to the management of natural fish populations. The 15 chapters, each of which can be read independently of the others, are directed towards assisting the fishery manager with implementation of genetic methods, a strategy that has been largely ignored throughout the history of fisheries management. The book is expressly written for the fishery manager and not the aquaculturist. Several of the chapters, however, are equally applicable to the latter.

In the opening chapter, Allendorf, Ryman and Utter underscore the importance of fish in the human diet and point out that most of the fish consumed are captured from wild populations. This chapter sets the stage for the remaining chapters and provides an interesting view of the unfortunate historical lack of a genetic perspective in fisheries management. The authors suggest that fisheries managers have been slow to incorporate genetics in their management decisions because of (1) the domination of the field by taxonomists who are interested in group rather than individual differences, (2) the great phenotypic variation within species which is often largely environmental rather than genetic, (3) the difficulty of

assessing genetic divergence because of the environmental sensitivity of fish and (4) vague management goals. The role of genetics in fisheries management is suggested to be applicable to decisions regarding the differential harvesting among and within populations, managing hatchery populations and assessing the impact of hatchery fish released into the wild.

Eight chapters are devoted to various aspects of population structure including protein electrophoresis (chapters 2, 5, 9 and 10), measures of genetic variation within a subdivided population (chapter 4), genetic distance and molecular phylogeny (chapter 8), and mitochondrial DNA (chapters 11 and 12). Chapter 2, by Utter, Aebersold and Winans describes the basic principles, strengths and limitations of protein electrophoresis while chapters 5, 9 and 10 provide examples of using electrophoretic data to elucidate population structure. Chapter 4, by Chakraborty and Leimar, provides a highly technical description of F -statistics for quantification of genetic variation in a subdivided population. This is by far the most difficult chapter because of its bewildering array of notation. With three different methods of calculating F -statistics presented, I suspect the average fisheries manager will be left wondering which method he should use to measure population structure. In chapter 11, Ferris and Berg give a good description of methods for assessing variation in mitochondrial DNA. Gyllensten and Wilson (chapter 12) follow with an example of mitochondrial DNA variation in salmonids.

Three chapters address issues concerned with maintenance of hatchery stocks. Gall's discussion of inbreeding (chapter 3) is excellent and should be easily understood by fisheries managers not trained in population genetics. He describes the basis for inbreeding depression, minimizing inbreeding, the consequences of random drift in small populations and equilibrium between migration and genetic drift. Allendorf and Ryman (chapter 6) build upon the foundation laid down by Gall and provide recom-

mendations for genetic management of hatchery stocks. These authors extensively document published reports on loss of genetic variation in hatchery stocks. Specific recommendations are given for founding, maintaining and monitoring hatchery stocks so that the loss of genetic variation can be minimized. Chapter 15, by Nelson and Soulé, is devoted to the genetical conservation of exploited fishes.

The impact of releasing hatchery stocks into the wild is addressed directly or indirectly in three chapters. In chapter 7, Campton discusses methods of detecting hybridization and introgression in natural fish populations and making genetic interpretations of hybridized populations. Thorgaard and Allen (chapter 13) discuss various chromosome manipulation techniques which can yield either sterile fish to be released into the wild or fish which will carry readily identifiable genetic markers. Altukhov and Salmankova (chapter 14) follow with an assessment of stock transfer in chum salmon populations and discuss the implications for management and conservation of fish populations.

Overall, the book should find practical use among fisheries managers owing to the lucid presentation of theory and the excellent supporting examples of applying the theory to fishery management. Further, the content of the book is sufficiently broad to make it an excellent reference text for a course devoted to genetics in fisheries management. There is some overlap in content of several chapters but this should not detract from its utility. While the chapters are independent papers, use of the book as a reference is facilitated by the placement of all references together at the end of the book. The paperback version of the book I reviewed admirably withstood continual cross-reference between chapters and the references section.

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