immunization. The chapter gives a critical and well balanced overview about the many algorithms in current use to predict B cell and T cell epitopes. A new algorithm, developed in the authors' own laboratory and based on the apparent preponderance of β-turns in protein epitopes, is presented. In spite of all their sophistication, the success rate of the prediction methods remains modest.

The ever increasing use of peptide antigens has been fostered by tremendous improvements in automated solid-phase peptide synthesis and by new and ingenious methods to rapidly and simultaneously synthesize large numbers of peptides in small amounts and in forms suitable for different immunological applications. Three chapters are related to the chemical synthesis of peptides. In chapter 3, B. Walker gives a concise and clear presentation of current synthetic procedures, covering the pros and cons of Boc and Fmoc protection strategies as well as of the attention that has to be given to the proper choice of side chain protection. Peptides are generally poor immunogens and a recurrent task is to render them immunogenic, which in the past has been achieved mainly by coupling the peptides to a high molecular weight carrier that helps to improve immunogenicity and to enhance T cell help. A purely synthetic approach has been taken by J.P. Tam. His multiple-antigen peptide system is presented in chapter 4 and discussed together with the more traditional carrier approach.

Also dealing with new methods of peptide synthesis is chapter 7 on 'Epitope mapping using synthetic peptides' (J. Worthington and K. Morgan). Practical aspects of Geysen's 'Pepscan' technology in which hundreds to thousands of short peptides are synthesised onto plastic pins and directly used in immunoassays are surveyed and the use of this astonishingly simple method for the mapping of B cell and T cell epitopes is illustrated by examples from the authors' own work. Multiple peptide synthesis has had a strong influence on the way epitopes are conceived by many researchers. This is unfortunate as epitope mapping with peptides is necessarily limited to the detection of sequential epitopes, that is, epitopes of proteins that can be successfully mimicked by a short synthetic peptide. Although I do not share the minority view of those who doubt that peptides are at all useful for epitope mapping, I find that the problems with the peptide approach of epitope mapping have not been sufficiently considered in this chapter. The allusion given that all possible epitopes of a particular protein can be identified by the peptide approach is a misconception of what epitopes are and of the very disparate nature of epitopes: Epitopes are not an intrinsic property of a protein per se but exist only by virtue of a connection with complementary antibodies, hence it is conceptually impossible to identify 'all possible epitopes' (p. 81), not even all possible sequential epitopes. The reaction of antisera with peptides cannot disclose the majority of epitopes on a native protein as these are mostly discontinuous and often cannot be mimicked by short peptides. The situation is simpler for monoclonal antibodies, but also here the peptide mapping approach is restricted. The same applies to 'Epitope mapping using libraries of random peptides displayed on phage', the title given to the chapter by W.J. Dower and S.E. Cwirla. Unfortunately, I also could not find a reference of caution about the limits of this otherwise most elegant and highly proficient technique. Chapters on the use of peptides for preparative immunoaffinity chromatography (M.R. Price and K. Beyzavi) and on the different immunoassay procedures currently in use to analyze anti-protein and anti-peptide antibodies round up this useful small volume which deserves to become a good companion to the scientist at the bench.

Hans Rudolf Bosshard

Immunocytochemical Methods and Protocols. Methods in Molecular Biology, Vol. 34; Edited by L.C. Javois, The Humana Press; Totowa, 1994; xiv + 435 pp. $64.50. ISBN 0 89603 285x

Immunocytochemistry is important to many disciplines that need to evaluate the distribution and cellular heterogeneity of antigens. A vast number of techniques are available today and the novice will need guidance through the many complicated steps involving cell and tissue fixation, pretreatment, staining and evaluation.

Immunocytochemical Methods and Protocols consists of 48 chapters divided into sections dealing with antibody preparation, tissue preparation for light microscopy, light microscopic immunocytochemical detection systems, fluorescence-activated cell sorting (FACS), colloidal gold detection systems for electron microscopy, photomicrography, and special applications including immunocytochemical detection of non-radioactive in situ hybridizations, confocal microscopy and laser microbeam applications. This volume, hence, has a big scope and guides the reader through many different techniques in many chapters. A few of these, like some of the FACS chapters, have nothing to do with immunocytochemistry but nevertheless represent fascinating reading.

The book contains some outstanding contributions. Particularly chapter 8 by Melissa A. Melan gives a competent and critical overview of cell fixation and permeabilization which successfully balances the subsequent chapters 9–11. These chapters take the everyday problems of a pathology department as their starting point, including the practical compromises that are necessary in such a setting. They may therefore not be entirely relevant to a more experimental setting. Mark C. Willingham has contributed two excellent treatises on immunocytochemistry of tissue culture cells and Lorette Javois writes about the important aspects of whole-mount stainings. Gary Bratthauer describes well the use of different immunoenzymatic detection procedures and Robbert Cunningham and associates treats the important aspects of immunofluorescence and FACS. Good descriptions of colloidal gold methods are provided by Constance Oliver and Liana Harvath provides a nice overview of confocal microscopy. Treatment of non-radioactive in situ hybridization (unfortunately termed 'nucleic acid immunocytochemistry') is restricted to chromosomal hybridizations. This is a pity as many workers today want to combine mRNA in situ hybridization and immunocytochemistry. Information about these methods will have to be sought in specialized volumes on in situ hybridization methods.

Although generally good, there are some sad omissions from this volume. First and foremost one lacks an overview of the limitations and pitfalls of immunocytochemistry as well as an in-depth discussion of the necessary control procedures. The short chapter 1 on overview of antibody use in immunocytochemistry is too brief and ignores many of the major pitfalls. Other omissions include lack of descriptions of double- and triple-staining methods as well as the vast area of quantitation, model systems and auxiliary techniques like Western blotting. Perhaps these omissions can be rectified in forthcoming updates. This book is a useful, sometimes beautiful, compilation of protocols and methods, which, however, lacks the critical overview that allows it to stand by itself as the text on immunocytochemistry.

Lars-Inge Larsson

Guidebook to Cytokines and Their Receptors; Edited by N.A. Nicola, Oxford University Press; New York, 1994; xx + 261 pp. £22.50. ISBN 0 19 859946 3

In the field of cytokines a guide is as important as on the way to the Matterhorn. Guides should show the way and prevent false steps (which are much more frequent, but less deadly in the cytokine field).

The book begins with color diagrams of the 3D structure of prototypic cytokines and schemes of cytokine receptors, and two introductions (to cytokines and cytokine receptors), which are very useful as they emphasize common structural and functional features, and ends with tables listing the chromosomal location of the

corresponding genes in the mouse and in man. The reader is guided by short chapters, one for each cytokine and for each cytokine receptor, which are written by cytokine specialists.

Is this book a good guide? It is the best concise and up-to-date information on cytokines I know, and probably the source of choice for anybody wanting to collect rapidly the essentials on single effector proteins, their receptors and the way they signal.

Given the topic, it is almost mandatory to rely on a multitude of authors. From the specialists one should expect an accurate overview focusing on well established facts. Speculative information should be declared as such. Personal choices in content, references, emphasis and layout are the main drawback of the multi-author approach. The Editor (who tends to be blamed for all the mistakes while praise for success goes to the authors) must make sure that the single contributions are as homogeneous as possible. Only if this operation succeeds, will the book become a true guide: A simple, reliable, easy-to-use compilation of the essentials. In this respect, the book could be improved considerably. The same structure and the same subtitles should be adopted for all chapters on cytokines on the one hand and on receptors on the other. It is a good idea to start with a summary, but it is disappointing to see how much this information differs from chapter to chapter in content and pitch. As a test, I compared the summaries of the first ten cytokine chapters. The one on IL-6 is excellent, those on IL-1 and IL-5 acceptable, those on IL-2 and IL-4 uninformative, and the five remaining ones could be improved a lot. Referencing is also rather variable. In my opinion, 20 references per chapter should suffice, and no references should appear in the abstract. Outstanding and recent reviews in respectable and easily available periodicals should be favored. There are too many references to single books which are largely useless since the books are normally out of reach. An effort could also be made to standardize the illustrations. The sequences at least could be made much more readable by adopting the same font and layout throughout the book. It would be useful to standardize the schemes of the cytokine receptors (starting with the color pictures) and the 3D structures of the proteins, and to present the gene structures schematically. Peintre naif schemes (e.g., Fig. 2, p 51; Fig. 1, p 165, Fig. 2, p 200; Fig. 2, p 238) should be eliminated. Since I work on chemokines, I checked this topic in some detail. The major problem is the omission of the description of CC chemokines other than MCP-1, and the lack of a chapter on CC chemokine receptors. In the chapter on CXC chemokines I noticed some disturbing mistakes. In the Table at the end of the book, chemokines are subdivided into an 'MIP1 family' and an 'MIP2 family', terms that are not used for human chemokines and not found in the chemokine chapters. Furthermore, IL-8 is listed as a CC chemokine.

Nicola's Guidebook may be compared to the 'The Cytokine Facts Book' by Callard and Gearing. The Facts Book presents the sequences and the protein and gene structures very clearly. The accession numbers (which are somewhat hidden in the Guidebook) and other useful information are highly visible. The brief description of the 'MOLECULE', by contrast, is mostly uninformative and occasionally misleading, and the amputated references are problematic. The Facts Book is handy for the initiated reader looking for quick structural information. Most chapters of the Guidebook, by contrast, can be used by almost anybody to gather first information on a given cytokine, and to select further readings. Referencing with full title is, of course, very useful. My advice? Start with the Guidebook and consult the Facts Book if you get lost within the structural information.

Marco Baggiolini

Bioreactor System Design; Edited by J.A. Asenjo and J.C. Merchuk, Marcel Dekker, Inc.; New York. 1994; xiii + 620 pp. $195.00. ISBN 0 8247 9002 2

This edited volume describes different aspects of bioreactor system design. The various authors review subject areas in which they have specialized research interests. Focus is on the bioreactor design, which is covered in 10 of the 16 chapters in the book. In the foreword E.T. Papoutsakis states: 'There is plenty of material here to satisfy a large spectrum of needs, from those of the practical-oriented biotechnologist and applied biologist to the educational needs of the quantitative- and fundamentals-oriented graduate students'. I agree with him on the first account, whereas I doubt that the text would be of much use for teaching purposes. The text is not sufficiently homogeneous and there are too many repetitions of basic material, e.g. in chapter 5, 18 pages are devoted to mass transfer in bioreactors, a topic which is covered extensively in two other chapters.

The text is introduced with an overview (Design of a Bioreactor System: Overview by J.C. Merchuk and J.A. Asenjo) and thereafter follows three parts: Part I covers biological systems and media design (three chapters); part II covers bioreactor design (ten chapters); and part III covers bioreactor support systems (two chapters).

In chapter 2 (Organism Selection) F.J. Castillo gives an extensive review (371 references) of selection of an organism for a bioprocess. The review is short and concise, and it gives the necessary information required for more detailed studies. Furthermore, it includes a valuable table listing institutions and companies (with complete addresses) that provide services in connection with selection of organisms. Chapter 3 (Bacterial, Yeast and Fungal Cultures by M.D. White, B.R. Glick and C.W. Robinson) discusses the influence of choice of microorganism, and chapter 4 (Design, Formulation, and Optimization of Media by R.J. Ertola, A.M. Giulietti and F.J. Castillo) reviews media design and the influence of co-factors on growth and product formation.

Chapter 5 (Fundamentals of Bioreactor Design by C. Merchuk and J.A. Asenjo) covers different topics such as stoichiometry, kinetics, mass transfer and heat transfer. These topics form the foundation for any bioreactor system design, and concise presentation is therefore desirable. Unfortunately this is not the case. The material is presented in the classical way with an uncritical listing of simple (and a few more detailed) stoichiometric and kinetic models. In the presentation the nomenclature is inconsistent and there are even some misunderstandings, e.g. a statement that a degree of reduction balance gives an additional relationship to the elemental balances. Chapter 6 (Stirred Tank Bioreactors by M. Reuss) and 7 (Pneumatically Agitated Bioreactors by K. Schügerl and A. Lübbert) deals with mass transfer in bioreactors. Both chapters are of a very high quality with illustrative examples of simulations and experiments. Chapters 8–12 cover more specific bioreactor systems (Membrane Reactors by P.M. Salmon; Immobilized Microorganism Bioreactors by H. Fukuda; Immobilized Animal Cell Bioreactors by M.S. Croughan, T.-W. Chiou and D.I.C. Wang; Plant Cell Bioreactors by P.D.G. Wilson and M.G. Hilton; Photobioreactors by A. Prokop and L.E. Erickson). Chapter 13 has a short overview of different Bioreactor Operation Modes by T. Yamane, with a presentation of the basic mass balances. These simple balances are important for any design problem, and considering the title of the volume this material is not given much space. Thus it is treated in much more details in several textbooks. The last chapter in part II of the book (Scale-Up by C. Solà and F. Gòdia) is a good overview of different scale-up approaches with a few case studies.

The last part consists of two chapters devoted to Sterilization and Containment (by A. Sinclair and M.H.J. Ashley) and to Bioreactor System Supplies (by T.M. Roberts, M.J. Kearns and T.J. Latham). These chapters give a short overview of the topics and they may be of interest to researchers involved with the more practical aspects of bioreactor design.

Jens Nielsen