

Perspectives in Theoretical Nuclear Physics. K. Srinivas Rao and L. Satpathy (eds). Wiley Eastern Ltd., 4835/24, Ansari Road, Daryaganj, New Delhi 110 002. 1994. 243 pp. Price not known.

This volume contains a collection of articles in memory of Sreedharan Chandra Kumar Nair, a distinguished nuclear physicist. Nair's research interests were fairly wide. Nuclear beta decay was a bewilderingly complicated subject until the appearance of the universal V-A theory of weak interaction invented by Marshak and Sudarshan in the spring of 1957. Nair along with Blin-Stoyle and other colleagues made several important contributions to the determination of the weak-coupling constants and his work culminated in a well-known review article in *Advances in Physics* in 1966. The article by T. Pradhan in the memorial volume gives an excellent introduction to the early development of weak-interaction theory. As the fundamental aspects of the theory became well-established, weak interactions become an important tool to study nuclear structure. S. K. Singh's article deals with the use of inclusive neutrino reactions to study nuclear medium effects on the total cross-section and the energy spectrum of the outgoing leptons. R. Parthasarathy suggests using exclusive reactions to study the effect of isospin mixing, in nuclear levels.

Nair spent a considerable part of his research life studying problems of nuclear structure using the Shell model and the collective model pictures. Manoj Pal's article gives a lucid introduction to later developments like the interacting Boson model. Several of Nair's former colleagues have contributions dealing with magnetic moments, moments of inertia, superdeformed shapes, and band structures in bromine isotopes.

Beginning with the early 1970s, quantum chromodynamics (QCD) has come to be established as the theory of all strong-interaction phenomena. Over the years, the attention of nuclear theorists has shifted to seeking explanation of nuclear properties from QCD. One of the striking paradoxes of the potential model picture of the quark-quark interactions is that while it works quite well at the level of a single nucleon, if the potential picture is extended to several nucleons just as one is used to doing in molecular physics,

large Van der Waals forces are predicted, which flies in the face of experiments. Mitja Rosina deals with some aspects of this problem. Mira and Jishnu Dey deal with relativistic aspects of the quark model. Gambir and Ring show how to avoid spurious states that arise in relativistic mean field theory. Devanathan, Karthiyayini and Ganeshamurthy present an interesting model for the quark and gluon distribution functions.

There are articles on heavy-ion collisions by Gross and by Ramamurthy. Kinematical and group-theoretical issues are the themes of the articles by Ramachandran Sirsi and Devi as well as Srinivasa Rao and Rajeshwari. Nuclear compressibility is the subject of the paper by Satpathy. He shows how the extensive data on nuclear masses can be used to pin down accurately the compressibility modulus not only for infinite nuclear matter but even for the surface and Coulomb terms.

Also included in the volume (despite its title) are four articles by former colleagues of Nair in areas outside Nair's research interests. While we should be grateful to the editors for putting together a valuable collection of articles, the reviewer wishes that they had exercised better editorial control. Proof reading should have been much better; many articles appear without abstracts and worse still some articles fall below reasonable standards. It would be cheap to assign the blame solely to the editors. (I wish some of the authors had maintained better professional standards.) This volume recalls the era of the 1960s and 1970s, when theoretical nuclear physics activity was strong in India. Unfortunately, there has been considerable decline in the number of young people entering this field in India. While this trend is generally true in the rest of the world as well, research in nuclear physics continues to be at the frontier. One only needs to look at the calendar of events at the Institute of Nuclear Theory at Seattle or its counterparts in Europe or Japan. I hope senior nuclear physicists of India would take the initiative in establishing a similar centre in India, which I am sure will gladden the soul of Nair.

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Annual Review of Immunology 1994. William E. Paul (ed.). Annual Reviews Inc., 4139 El Caminoway, Palo Alto, California 94303-0897, USA. Vol. 12. Price: USA \$ 48.

The Annual Review of Immunology, Vol. 12, features 29 articles dealing with six broad, sometimes overlapping, areas of (1) tolerance, (2) lymphocyte ontogeny and development, (3) antigen-T driven interactions and binding by cytolytic T lymphocytes (CTL), T cell receptors (TCR) and major histocompatibility complex (MHC) antigens, (4) signal transduction in B and T cells, (5) lymphokine profiles of T helper subsets, their balance and cross-regulation. Other new and emerging topics include extrathymic T-cell-development in the intestinal epithelium, the idea of peptide mediated TCR antagonism, involvement of CD40 antigen in B cell antibody production and other immunological events, role of the transcriptional factor NF κ B in the immune system, an in-depth overview of chemoattractants, the anaphylatoxin C5a, their specific receptors and their functions as well as the all-pervasive area of AIDS vaccines.

What would it be like to shake up the existing immunological concepts. The opening and ending articles by Cohn and Matzinger, respectively, do just this. The former introduces a new immunological unit called 'protecton', while both articles may, in fact, revise an immunologist's interpretations of his basics. Quite significant is Matzinger's statement: 'It is about the belief that the immune system's driving force is the need to discriminate between self and nonself. I have abandoned this belief.' These new interpretations may sustain some support from the information described by articles covering the area of lymphocyte ontogeny and development. In their article on B cell development Melchers *et al.* summarize the data obtained from gene-targeted mutants about early B cell differentiative events. Mature B cell development, they say, is independent of productive immunoglobulin (Ig) gene rearrangements but dependant upon the rescue of immature surface Ig positive B cells by unknown antigens that interact with surrogate light chains that are distinct from those of the surface Ig receptor. A similar such interaction between the MHC and the surrogate TCR chains may be involved during post-

tive selection of T cells in the thymus.

Robey and Fowlkes in their article 'Selective events in T cell development' describe the regulatory influences of α and β TCR gene rearrangements and the role of peptide antigen on events occurring during thymic T cell development. Positive and negative selection events have been interpreted using affinity models for TCR-antigen interactions. Knock-out mice obtained by gene targeting methods have not only revolutionized immunology but have also provided decisive answers to many unanswered questions on lymphocyte ontogeny and development. All genes, including cytokine genes targeted to examine events during thymic T cell development as well as their effects on peripheral T cell functions, have been excellently reviewed by Pfeffer and Mak. Continuing on this topic, confirmation that the thymus is not the only site for T cell education should be greatly interesting. Poussier and Julius describe evidences indicating that the intestinal epithelium is also a primary lymphoid organ which, like the thymus, supports T cell lymphopoiesis and differentiation but not without differences.

The powerful impact of transmembrane signalling and protein phosphorylation events in modern biology is again reflected by the inclusion of three full articles devoted to this subject. The involvement of Src-family kinases Lck and Fyn as well as of the Syk-family kinase ZAP-70 and the role of common peptide sequences called ARAM in TCR-mediated signalling are described by Chan, while the structure-function analyses of the CD45 antigen, its wide role as a tyrosine phosphatase-regulating Src-tyrosine kinase during the activation of T cells and other haematopoietic cells are detailed by Trowbridge. In addition, transmembrane signalling events seem to share common features even in B cells. While describing the structural and molecular features of the B cell receptor (BCR) complex, Cambier *et al.* consider the role of Lck, Fyn and other cytoplasmic effector molecules during antigen-BCR-induced signalling. A general model for signalling in B cells is presented. Binding between cell surface CD40 and its ligand is another interaction that has been shown to play a critical role during antigen-induced B cell proliferation, formation of memory B cells and B cell development in lymph nodes. All these aspects and the role of follicular

dendritic cells, centrocytes and centroblasts in antibody production are found in separate articles entitled 'Germinal centres' and 'CD40 antigen and its ligand'.

Six different articles deal with the general area of antigen-driven interactions and antigen binding. They discuss (i) the identification and characterization of crucial structural features needed for peptide-antigen binding to MHC class I and II molecules, (ii) antigen presentation by Class I-B molecules, (iii) target antigen recognition and mechanisms of lymphocyte-mediated cytotoxicity, (iv) antigen selection of anti-DNA antibodies, (v) assembly and transport of MHC class II molecules and (vi) peptide-antigen-mediated TCR antagonism. To emphasize some points, assembly of MHC class II structures requires the participation of the invariant chain and other chaperones, finally leading to the transport of the complex to the cell surface through the golgi apparatus via late endosomal compartments. Cresswell elucidates the role of the proteasome complex and transport proteins TAP-1 and TAP-2 in the generation and transport of peptides from protein antigens. The understanding of peptide residues critical for binding to MHC and recognition by the TCR has led to the discovery of TCR antagonism according to Sette *et al.* This is increasingly being used in attempts to inhibit T cell responses during inflammation and autoimmune situations.

Regulating the balance between Th1- and Th2-type helper T cells is being recognized as a promising strategy to intervene therapeutically and alter the course of disease states. Since the lymphokines produced by these subsets can regulate Th1/Th2 balance and because antigens can preferentially activate one or other T helper subset in different animals, it is now considered important to account for the host genetic background while formulating approaches for disease control. All this and the differentiation of Th1/Th2-type cells from naive precursors as well as their cell surface markers are considered in two articles, one by Romagnani and another by Seder and Paul. Since the AIDS virus promotes the apoptotic cell death of Th1 cells, Cease and Berzofsky note that the next generation of synthetic peptide and recombinant vaccines will have to consider the immunobiology of AIDS infection. All currently

available AIDS vaccines are reviewed in their article.

Two other articles that may interest clinical immunologists would be 'Immunological aspects of allergic asthma' by Bochner *et al.* and the article on oral tolerance by Weiner *et al.* While the latter deals with the treatment of organ-specific autoimmune diseases by administering antigens orally to induce antigen-specific and nonspecific suppression, the former deals with the wide variety of immune reactions as well as the role of cytokines and adhesion molecules in allergic asthma. Another article of special interest is the review by Winter *et al.* that describes in detail the technique and utilization of filamentous bacteriophages to develop antibody reagents for research and therapy.

Thus, this volume, although not without occasional typesetting errors, reflects excellently the latest not only in new emerging areas but also updates several older topics as well.

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Volcanism: Radhakrishna Volume. K. V. Subbarao (ed.). Wiley Eastern Limited, 4835/24 Ansari Road, Daryaganj, New Delhi 110 002. 1994. 332 pp.

Basalts are the most voluminous rocks on the Earth forming the bulk of the oceanic crust. They are the most abundant rocks on the Moon and other terrestrial planets. The recent spate of studies on the lunar and oceanic rocks has brought in loads of new information on basalts. On the continent, the present attention is focussed on flood basalts such as those of Deccan, Siberia, Karoo and Columbia River. K. V. Subbarao of IIT, Bombay, along with his foreign collaborators has generated prodigious data on Deccan basalts and has now turned his attention to basalts in general. The present outstanding volume of edited papers is the outcome of this effort. The volume is dedicated to one of the most revered and celebrated geologists of our time, Padmashri B. P. Radhakrishna. BPR is not a mere luminary but an institution in himself and this valuable volume is a