Annual Review of Nuclear and Particle Science 1994. C. Quigg and U. Luth, eds. Annual Reviews Inc., 4139, El Camino, Palo Alto, California 94303-0139, USA. Vol. 44. 730 pp. Price: USA $ 62, elsewhere $ 67.

This is yet another excellent volume in this well-known series. The reviews range over a variety of topics in nuclear and particle physics, both experimental and theoretical. Advances in this field affect society at large in many ways – on the one hand there is the continuing threat to our very survival posed by nuclear weapons, while on the other, some of the life-saving advances in medicine have been made possible because of advances in nuclear science. Research in experimental high energy physics has now become extremely expensive and construction of new research accelerators is possible only with multinational funding and building new detectors and experimental facilities, which calls for collaboration by physicists' teams drawn from several countries.

Volume 44 opens with a delightful piece of personal reminiscences of the period 1930–50 by Robert Serber. This is followed by three articles in nuclear physics. The first one deals with the measurement of temperature in a nuclear reaction using a variety of methods – velocity spectrum of individual particles, relative yields of different kinds of particles and relative population of internal states of the emitted particles. The second article tells us how to use high energy gamma rays from the giant dipole resonance excited in the compound nucleus prior to its break up, to learn about fission time scales. The third article deals with isovector excitations arising in weak (charged current), electromagnetic processes as well as hadronic scattering. Valuable insight has been gained about several nuclear matrix elements, for example the quenching of the Gamow–Teller amplitudes.

Impressive progress has been made in the study of double beta-decay, the usual but very rare one with two neutrinos, and theoretically exciting possibility of neutrinoless decay as well as the more speculative majoron case. From the absence of neutrinoless decay of ^{76}Ge and ^{128}Te, we can conclude that the electron neutrino mass must be less than 1 – 2 eV. These limits will improve further in the coming years. The review on 'geometrical colour optics' by Frankfurt, Miller and Strikman, who have made pioneering contributions in this area, provides a survey of several topics – colour transparency, soft diffractive physics, colour fluctuations in nucleon and nucleus collisions.

Study of deep inelastic scattering for low values of the Bjorken variable x is currently witnessing intense theoretical activity. This region is neither perturbative nor is it non-perturbative in the sense of soft hadron physics and calls for new theoretical approaches. E. Levin, one of the leading researchers in this area, and E. Laenen cover much of the recent theory.

Study of charmonium states as Cester and Rapidis explain remains a vital and worthwhile endeavour. High precision experiment using antiproton–proton annihilations is the theme of this review.

The Bjorken sum rule dealing with polarized electroproduction has made an enormous impact in our understanding the structure of the nucleon. Production of polarized targets is a vital experimental need. Polarized H, D, ^{3}He targets are the subject of the review by Chupp *et al.*

There are three excellent articles in the area of detectors, one on crystal calorimeters and the second one on large arrays of escape-suppressed gamma-ray-detectors. The third one looks into the special problems posed by high luminosity colliders. CERN will build the large hadron collider (LHC) in the coming years. One expects extremely large event rates due to two reasons. The luminosity of the machine will be some three orders of magnitude higher than the tevatron and the cross-section will also be higher.

As P. L. Petti and A. J. Lennox explain, photon therapy has become the workhorse of radiation therapy for the last several decades. Certain tumours called radio-resistant tumours respond poorly to X-rays. Besides sometimes one has to deal with tissues which are close to a very critical body structure such as the spinal cord. Hadronic radiotherapy therefore uses particles such as neutrons, protons, pions, helium or heavier ions to deal with these situations.

Gravitational waves predicted by Einstein's general theory of relativity are virtually impossible to detect if the source itself is a weak one. One must look for them in violent events in the cosmos. A careful description of sources like supernovae, black holes, neutron stars and coalescing compact objects is given by Bonazzola and Marck.

Finally there are two very excellent articles dealing with larger issues – one on the electron–proton collider HERA, which is not only a scientific and technical marvel, but also a symbol of what human beings can accomplish when they transcend artificial limitations imposed by nationality. G. A. Voss and B. H. Wiik tell us the history from conception to successful completion of HERA. The other article by Drell and Peurifoy carefully examines the technical issues of nuclear test ban, from the perspective of the USA. Issues like safety, reliability, yield, clandestine testing by other nations being undetected, maintaining competence in the weapons community, building of better (?) weapons are examined. The authors clearly state that none of the above is a valid objection against the USA signing the comprehensive test ban treaty (CTBT) in 1996.

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Annual Review of Nutrition 1995. Donald B. McCormick (ed.). Annual Reviews Inc., 4139, El Camino Way, P.O. Box 10139, Palo Alto, California, 94303–0139, USA. Vol. 15. 518 pp. Price USA $ 48, elsewhere $ 53.

Has the science of nutrition lost its identity and merged with modern sciences like cellular and molecular biology and molecular genetics? Going through the volume 15 of the *Annual Review of Nutrition*, it would seem that way. Most of the 21 reviews (plus a prefatory chapter) included in this volume deal with genetics, molecular and cellular aspects of nutrient functions, transport, and metabolic disorders. This is neither a criticism nor a complaint, since the fare that is provided is very interesting and useful and indicative of modern trends in nutrition research. Public health nutritionists may, however,

feel disappointed because even the remaining reviews, except the prefatory chapter, deal with biochemical and/or clinical nutrition.

In terms of variety of foods to suit diverse health needs, perhaps no country can beat the USA. The vital role played by the Food and Drug Administration, USA, is discussed by David Kessler in the prefatory chapter 'The Evolution of National Nutrition Policy'. A variety of strategies such as stringent labelling, creation of public awareness, interaction between government agencies and encouraging technological development for more healthful, more abundant and more affordable foods have been employed. In the post-liberalization era, India can learn from the US experience.

Three reviews deal with vitamin K. A new carbanion model that mimics the proton extraction from the gamma position of protein-bound glutamate has been proposed by Dowd *et al.* for the vitamin K-mediated carboxylation of glutamates in specific proteins (Gla-proteins) involved in blood clotting and in bone mineralization. Vermeer *et al.* discuss the role of vitamin K in bone metabolism. While vitamin K deficiency affects bone mineralization, it promotes atherosclerotic vessel wall mineralization. A hypothetical explanation has been provided to explain such divergent effects on bone vs vessel wall. J. W. Suttie (a pioneer in the field of vitamin K) discusses the importance of menaquinones (vitamin K-active compounds synthesized by intestinal bacteria) in human nutrition. Excess of fat-soluble vitamins, particularly vitamin A is known to be toxic. Recent work on structure–function relationship of retinoids, and the molecular mechanisms of action of teratogenic doses of retinoids are reviewed by D. R. Soprano and K. J. Soprano.

A review on 'Whole Body Protein Turnover in Humans' by J. C. Waterlow deals with conceptual problems and controversies in the subject – mainly arising out of methodological limitations, and their implications on protein requirement. Cellular proteolysis is a well-regulated phenomenon in which at least three types of proteolytic reactions are known. Ubiquitin-dependent proteolysis is one such mechanism, and is reviewed by K. D. Wilkinson.

The scope of computer modelling in designing animal feeds to increase productivity is discussed in the review on 'Energy Partitioning and Modeling in Animal Nutrition', by R. L. Baldwin and R. D. Sainz.

Recent research on dietary management of an X-linked genetic disorder, adrenoleukodystrophy, does not provide hope for treating this fatty acid-disorder disease, by oils containing erucic and oleic acid, though asymptomatic individuals may get some relief from later neurological disabilities according to H. W. Moser, and J. Borel. Saturated fatty acids have for long been implicated in coronary artery disease. The review on 'Trans Fatty Acids and their effects on Lipoproteins in Humans' by Katan *et al.* shows that trans fatty acids (primarily derived during partial hydrogenation of vegetable oils) behave like saturated fatty acids and hence *cis* and *trans* unsaturated fatty acids are not the same. Two reviews deal with lipoprotein metabolism. The review on 'Hypobetalipoproteinemias' by G. Schonfeld, discusses the genetic basis of this condition in which the levels of LDL cholesterol and consequently the risk of atherosclerosis are markedly reduced, but the risk of cancer is greatly enhanced. The reasons for the latter are not known. A transgenic apolipoprotein E-deficient mouse is the first rodent model for atherosclerosis. It provides new opportunity to study this protein and its metabolism. Clinical and biological importance of this protein and the early experiments performed on the mouse model are discussed by A. S. Plump and J. L. Breslow.

While the role of tight junctions particularly in the intestinal permeability and transport of sugar (a controversial issue) has been reviewed by Ballard *et al.*, molecular mechanisms in the insulin-mediated uptake of glucose by the insulin-dependent cells is discussed by M. P. Czech.

Thyroid hormone regulates both the production and consumption of energy, besides several other effects. While its nuclear mechanism of action is beginning to be understood, the mechanism of T3-mediated stimulation of metabolic rate remains to be understood. The current thinking on the mechanism of thyroid-mediated thermogenesis and its significance are dealt with in the chapter on 'Thermogenesis and Thyroid Function' by H. C. Freake and J. H. Oppenheimer. The conversion of T4 to T3 is mediated by a set of deiodinases, two of which D-1 and D-3 are selenoproteins. Structural, functional and regulatory aspects of the three enzymes, and their nutritional and hormonal regulation are reviewed by P. R. Larsen and M. J. Berry. Glutaminase is another important enzyme whose regulation is covered in this volume by N. P. Curthoys. The two isoenzymes of this enzyme (kidney type and liver type) are differently regulated.

Among the trace elements, a review by Mascotti *et al.* discusses the regulation of iron metabolism, particularly the translational effects mediated by iron, hemin and cytokines, on expression of ferritin. Iron-binding proteins such as lactoferrin have a variety of functions. Molecular structure and biological functions of lactoferrin are reviewed by B. Lonnerdal and S. Iyer. Another important protein in haemopoesis is erythropoietin, an endocrine hormone growth factor produced by specialized renal cells. Regulatory, functional and clinical aspects of this hormone whose recombinant form is available for clinical use have been discussed by W. Fried. In a review entitled 'Cellular Copper Transport', C. D. Vulpe and S. Packman have reviewed aspects of copper transport in unicellular organisms as well as transport, distribution and release of copper in mammalian cells. Genetic and molecular aspects of diseases like Menkes and Wilson which are related to defective copper release are also discussed.

In an interesting review, Horseman and Buntin discuss the role of prolactin in the regulation of pigeon cropmilk secretion and parental behaviours.

A list of related articles in other annual reviews such as *Annual Review of Biochemistry*, *Annual Review of Medicine*, *Annual Review of Physiology* and *Annual Review of Public Health* has also been included after the contents page.

The 15th volume of the *Annual Review of Nutrition* should interest all students and researchers in biology and not just nutritionists.

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