

involved. India is a leading sea food producer and exporter, the maximum export has always revolved around marine prawns fetching 80 per cent of the revenue. The present production has stabilized around 1.5 lakh tonnes annually. To increase the present production, deep sea prawns have to be located and trapped and aquaculture developed into a major industry. Achuthankutty suggests substantial increase in the present aquaculture production of 35,000 tonnes through expanding the activity and use of advanced technology.

In a power-deficit country such as India, renewable energy such as ocean thermal energy conversion, wave energy and tidal energy look promising and relevant. Ocean energy is pollution free and has minimum health hazards. According to P. M. Koola this resource is most valuable for island communities.

The volume also contains discussions on certain related topics. A set of recommendations are included at the end on developing coherent environment management policies for India's EEZ of which the most important is the formation of a high level committee in which the government, relevant institutions, universities and industry are represented to co-ordinate and monitor the management of the EEZ.

The present series of papers contain authoritative information on the resources by experts and these will draw the attention of researchers, managers and planners to the problems involved in the economic use of India's EEZ. The recommendations would be beneficial for evolving suitable strategies for the sustainable realization and management of the resources.

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*Annual Review of Nutrition* is a valuable series that gives advances in both the basic

and the applied aspects of nutrition. It is this blend that makes this publication useful to the research scientists, the teachers, and the practitioners of nutrition. Even science administrators and policy makers may find information that they can use.

The prefatory chapter 'On the making of a clinical nutritionist', is by Bob Olson — a man who has contributed significantly to the basic science and application of nutrition. This autobiographical account is interesting and informative, with an element of nostalgia regarding the events that led to some important discoveries in nutrition and biochemistry.

The overall emphasis of the present volume is on recent advances in nutrient transport mechanisms, regulation of metabolism and diet and disease, particularly cardiovascular disease. Not a single article deals with nutrient deficiencies, which however, continue to plague the developing countries, and about which a lot is being said in other forums. Advances in micronutrients such as vitamins A, E and folic acid are, however, covered in other ways.

A review by Butterworth and Bendich discusses prevention of birth defects (neural tube defects — NTD) by periconception supplementation of women with folic acid. The incidence of NTD is 5 per 1000 births. Though folic acid deficiency is widespread among Indian women, how much of NTD can be prevented by folate supplementation is a moot point since both genetic and environmental factors are responsible for its causation.

Vitamin E deficiency in humans is rare and generally secondary to malabsorption or metabolic abnormalities in lipoprotein metabolism, rather than dietary inadequacy. However, being a powerful antioxidant, vitamin E supplements are being promoted as prophylaxis against degenerative diseases where free-radical-mediated cell and tissue damage is implicated. Do epidemiological studies support this notion? How much vitamin E is enough? Traber and Sies discuss these aspects in the chapter 'Vitamin E in human disease and delivery'.

Besides vitamin E, there are other nutrients and phytochemicals in food (vitamin C, carotenoids, flavonoids, etc.) which have antioxidant properties. Their functions are reviewed in the chapter 'Antioxidants in human health and disease' by B. Halliwell'. A lucid explanation of the

mechanism of action of reactive oxygen and nitrogen species is also given. Oxidation of low-density lipoproteins (LDL) by cells in the artery wall is believed to initiate the complex chain of atherogenic events, in which other lipid constituents, especially cholesterol also play a role. The role of dietary modifications, with special reference to anti-oxidants and fatty acids in atherogenesis is discussed by Reaven and Witztum.

While polyunsaturated fatty acids (PUFA) have a cholesterol-lowering effect, they tend to increase LDL oxidation. The solution is — a PUFA-rich diet along with anti-oxidant supplements. An interesting recent finding is, mono-unsaturated fatty acids like oleic acid (present in olive oil) is as good or better than PUFA, and that may be the secret of lower incidence of CVD in mediterranean region. The PUFA of fish oil is also very good.

The question of safe limits of dietary cholesterol and ways of achieving it, is still controversial, and covered in the chapter 'Cholesterol policy and the primary prevention of coronary disease' by Naylor and Paterson. New molecular markers will provide better insights into lipid-related atherosclerotic risk.

Obesity is an important predisposing factor in CVD. Frequency of obesity is greater among high-fat than low-fat consumers. Why? For answers, read the chapter 'Control of human appetite: Implications for the intake of dietary fat' by Blundell *et al.* High-fat diets seem to have lower long duration satiety effect, than carbohydrates or proteins, the latter being the best.

Humans and animals have the enzymes for *de novo* lipogenesis. For long this has been regarded to be the method of storing surplus non-fat energy. However, recent studies using stable isotopes question the relevance of this pathway in humans raising several questions. The basis of this dilemma is discussed by Hellerstein in the chapter 'Regulation of hepatic *de novo* lipogenesis in humans'. Use of stable isotopes has greatly increased our understanding of the regulation of carbohydrate and fat metabolism during and after exercise, though questions persist as seen from the update by Halloszy and Kohrt.

The molecular mechanisms involved in transport of nutrients between tissues, their uptake by the cells and in some cases binding to DNA, through receptors, are

beginning to be understood in recent years, thanks to the molecular biology tools. This volume of *Annual Review of Nutrition* devotes 5 chapters to these aspects. The role of peptide transporters, pept 1 and pept 2 in the intestine and the kidney has been discussed by Leibach and Ganapathy. Both types of receptors have been cloned and found to transport di- and tri-peptides using a transmembrane electrochemical  $H^+$  gradient. They have pharmacological importance in the transport of peptide-like drugs. A family of transport proteins for glucose and fructose have been identified. They have different properties and tissue distribution. (Olson and Pessin), and are involved in the regulation of blood and tissue glucose.

A complex set of cytoplasmic, and nuclear proteins for vitamin A and its active metabolite retinoic acid have been identified. A recent hypothesis that the cytoplasmic proteins are involved in retinoid metabolism is discussed by Li and Norris in the chapter 'Structure/function of cytoplasmic vitamin A binding proteins'. Identification of retinoids which stimulate selective responses through nuclear receptors has helped to elucidate the molecular mechanisms involved. Besides these, synthetic agents also have therapeutic effects according to Pfahl and Chytil.

A. C. Antony's article on 'Folate receptors', discusses the structure, functions and regulation of folate receptors. These receptors bind folate and anti-folate compounds. Folate receptors have been exploited for uptake of toxic proteins or drugs (packed in liposomes and conjugated to folate), by target cells. This is a new approach for targeting drugs to cancer cells. Folate receptors also play a crucial role in transplacental transport of folate.

The 16th volume also includes a variety of other topics such as, mechanism of food allergy, effects of food on drug absorption, dietary change and traditional food systems of indigenous people, parenteral nutrition in low-birth-weight infants, and some more. It is indeed a mixed and interesting fare with something for anybody interested in food, nutrition and health.

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**Annual Review of Biochemistry 1996.** Charles C. Richardson. Annual Reviews Inc., 4139 El Camino Way, Palo Alto, California 94303-0139, USA. Vol. 65. Price: USA \$59, elsewhere \$65.

Every biochemist eagerly looks forward to the *Annual Review of Biochemistry* not only for its exhaustive reviews in the area of one's interest but also as a possible source for the search of new research problems. The personalized account of research by well-known scientists in the prefatory chapter is also something one looks forward to. This volume of *Annual Review of Biochemistry* has 25 articles including the prefatory article by Daniel Koshland Jr, the former editor of *Science*. Interestingly, in 11 of the 24 reviews, there is some reference to disease and/or suggestions for improved therapies. While in some of the articles, there may be justification, in others the connection is less apparent! Generally, the *Annual Review of Biochemistry* covers a broad spectrum of areas and grouping them into categories is not easy. However, 11 of the articles are related to biology of nucleic acids. The other topics cover enzyme biochemistry, various aspects of protein structure, cellular signalling and drug resistance in *M. tuberculosis*.

Aspects of DNA repair have been covered in four reviews. Friedberg and Sancar explore the biochemistry of DNA excision repair in detail in prokaryotes and eukaryotes with emphasis on repair mechanisms in humans and coupling of transcription and nucleotide excision. Defective excision repair in humans has been recognized to be associated with hereditary diseases xeroderma pigmentosum, cockayne's syndrome and trichthiodystrophy. Since the transcription factor TFIIH appears to have an obligatory role in nucleotide excision repair, newer approaches can be adopted to study the molecular basis of these hereditary diseases. How mismatch-directed repair in *E. coli* takes place and the genes responsible for this are discussed by Modrich and Lahue. Since these reactions appear to be conserved during evolution, the reviewers suggest that inactivation of their homologous genes in mice and humans results in a large increase in spontaneous mutability and consequently predisposition to tumour development. In the review on DNA repair in eukaryotes

by Wood, the emphasis is on how DNA glycosylases and endonucleases carry DNA repair. Other articles related to DNA biochemistry describe how DNA helicases unwind duplex DNA, the regulation of telomere length which includes the biochemistry of the enzyme telomerase and other telomere-binding proteins and an update on DNA topoisomerases. The connection between cellular senescence, aging, cancer and telomeres is discussed in some detail in the review on telomere length regulation and should be of interest to those working in the molecular biology of cell division and malignant transformation.

Three articles discuss the biochemistry of ribonucleic acids with specific emphasis on mRNA. Splicing of mammalian pre mRNA has been extensively investigated and has also been the subject of several reviews. It is becoming increasingly evident that like in eukaryotic transcription and DNA repair, several proteins are involved in the splicing reaction of mammalian mRNA. The review by Kramer focuses attention on the various factors having splicing activities. The article has a table which indicates structural motif in these proteins which should be useful to those interested in correlating structure with function in nucleic acid-binding proteins. mRNA decay in eukaryotic cells is highly specific. The factors that initiate mRNA decay are covered in a review by Jacobson and Peltz. Recording, i.e. re-programming of translation is extensively discussed by Gesteland and Atkins.

The review on molecular mechanisms of drug resistances in *M. tuberculosis* by Blanchard is relevant as the appearance of multidrug-resistant strains poses serious health problems, particularly as only few drugs are effective therapeutic agents against this microorganism. The development of resistance even against fluoroquinolone class of antibiotics calls for new strategies to combat tuberculosis. One suggestion by the reviewer is combined administration of  $\beta$ -lactams and  $\beta$ -lactamase inhibitors. Since a large number of  $\beta$ -lactams are characterized, this approach could be both exploring as well as cost-effective compared to *de novo* synthesis and clinical evaluation of new compounds.

Mammalian amino acid transport with emphasis on genes coding for the various transporters and their regulation is