

## BOOK REVIEWS

**Annual Review of Nutrition, 2006.** R. J. Cousins *et al.* (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94303-0139, USA. Vol. 26. 608 pp. Price not mentioned.

In my student days, the *Annual Reviews* were always an inspiring read, and the prefatory chapters particularly inspirational. The prefatory chapter in this *Annual Review* lives up to usual standards, and is an autobiographical account of George Cahill's studies of the effects of starvation. The elucidation of the importance of beta hydroxybutyrate as a starvation fuel and its relevance to brain size is fascinating, as was the observation that this fuel could actually increase work performance while decreasing oxygen consumption in the perfused rat heart. Clearly, this is still an area of much intellectual flux and application. In addition, this volume has stand-alone chapters that will interest those involved in macro- and micronutrients, functional nutrients and clinical nutrition. It is impossible to review all these in the space available, so I will choose some which are relevant to Indian nutrition today; dealing with the problems of burgeoning obesity and related morbidity, pregnancy and growth, micronutrient status and clinical nutrition.

India has a dual burden of disease: these are related to the co-existence of too much or too little nutrition<sup>1</sup>. In relation to the former, particularly in urban areas, studies have implicated behavioural issues in the rapid increase in obesity<sup>2</sup>. Contemporary research in this area has focused on urbanization and physical activity<sup>2,3</sup>, but another priority area is what regulates feeding and appetite. Specifically, the role of fatty acids, particularly *de novo* synthesized fatty acids, in regulating food intake through central mechanisms represents a new and exciting area of research (see chapter by Wolfgang and Lane). Identification of malonyl CoA as a central player in this regulatory sequence of events is also promising, and the chapter on genetics of food intake and eating behaviour complements this information (see the chapter by Rankinen and Bouchard). The dream of any scientist involved in obesity is to identify targets of intervention, which in turn would allow for the development of genetically informed therapies to control food intake. Further, risk-factor assessment for chronic disease is still in its infancy in

India, notwithstanding the large urban prevalence of diabetes and hypertension. There have been several cross-sectional studies<sup>4-6</sup>, but the definitive need for longitudinal cohort-based studies is now being felt. Even so, understanding that novel risk factors may be operative to variable degrees in different populations is important; one such is asymmetric dimethyl arginine, which is the result of post-translational modifications of arginine residues in proteins by methylation, which inhibits the action of nitric oxide synthase, and which is associated with higher risk of cardiovascular disease (see Siroen *et al.*, in this volume).

From a different perspective, diseases or problems linked with too little intake are also important. This volume deals with micronutrient deficiencies (reviewed below) as well as the emergence of 'functional foods', which offer the hope that specific essential functions can be boosted through dietary means. As an aside, the latter may seem like unnecessary philological exercises that are solely designed to sell dietary products, for aren't *all* foods 'functional' when eaten in reasonable proportions? Nevertheless, with due acknowledgement to reductionism, it is worthwhile to deconstruct the functionality of foods. The 'function' of the brain (cognitive prowess), heart (in terms of fitness), intestine (absorptive capability), muscle (motor prowess) and immune system are identified at the forefront of desirable functionality. This is not to downgrade other functional capabilities: a dysfunctional skeletal frame or special sense is as detrimental (but perhaps harder to 'hard sell'). Several nutrients have had claims made about their functionality; however, few have withstood rigorous scientific testing. A review of the tenuous link between fatty acids and immune function is therefore appropriate and is well described in this volume (see chapter by Fritsche). It is often claimed that n-3 polyunsaturated fatty acids (PUFA) are efficacious in boosting immune function<sup>7</sup>. However, they have not been proved to be thus in clinical studies, and Fritsche, while reviewing these functions lucidly details the reasons for this, including technical study design issues. Nevertheless, n-3 PUFAs are still in the news for other reasons, linked to cardiovascular disease<sup>8</sup> and in India, to birth weight and gestational length<sup>9</sup>. One interventional study in India did find a change of almost 150 g in birth weight after supple-

mentation of soya oil equivalent to almost 1 g of alpha linolenic acid (ALA)/day from the 20th week of pregnancy onward<sup>10</sup>. Certainly the consumption of fish in India is vanishingly low<sup>9</sup>, and strategies to deliver n-3 PUFA or precursors such as ALA in novel ways are a challenge. The chapter by Whelan and Rust is interesting with a comprehensive table of fortified food products, some of which are already on the grocery shelves in India.

Micronutrient deficiencies are legion in India. Study after descriptive study has documented existing deficiencies, but iron (because of its functional significance related to work capacity, mental performance and indeed anaemia; and because of the relatively simple laboratory measurement of this deficiency) has captured the imagination of many Indian researchers. The recently published NFHS data<sup>11</sup> have also added urgency to the efforts for finding solutions. This volume deals with the interrelationship between iron and iodine, and the loss of efficacy of salt iodization programmes when iron deficiency coexists in a population (see the chapter by Zimmermann). Studies in India have been performed on salt fortified with iron and iodine<sup>12</sup> and more studies using compounds of iron that have low sensory properties and high stability, such as micronized ferric pyrophosphate are now needed<sup>13</sup>. Equally, too much iron is also harmful, and this needs to be viewed in the context of the (over) enthusiastic supplementation of iron. Regulation of iron homeostasis in the body is linked to hepcidin, which is a relatively newly discovered protein (see the chapter by Nemeth and Ganz). A lot needs to be understood about how hepcidin is itself regulated, but the chapters relating this protein and to haemochromatosis are educative. Revisiting the problem of low birth weight in India, one of the recently identified micronutrient deficiencies<sup>14</sup> associated with low birth weight (in addition to omega-3 PUFA as discussed above) is that of vitamin B<sub>12</sub>. An interesting hypothesis linked to the mechanism of action of this vitamin is methyl transfer and epigenetic phenomena linked to the methylation of genes<sup>15,16</sup>, but concrete evidence is still lacking in human studies. It is worth remembering, in addition, that the foetus lives in a high choline environment, and that presumably, choline and betaine are also important methyl donors. Animal studies have linked hypo- and hyper-methylation of DNA to

depleted choline status<sup>17</sup>. While data from our Bangalore pregnancy cohort were unable to demonstrate a relationship between crude measures of choline intake and birth weight (unpublished) despite an apparently large range of choline intake, it is necessary to evaluate this relationship in better ways. The opportunity to appropriately feed the pregnant Indian woman has never been greater or so important; the chapter on choline by Zeisel in this volume is relevant.

Recently, there has been much interest in the definition of daily essential amino acid requirements and the importance of protein quality<sup>18</sup>. Given the importance of protein nutrition today, the review by Hoppe *et al.* of the effect of cow's milk on longitudinal growth is timely. Secular trends in improving height and nutritional status are evident everywhere. Yet, these need to be evaluated in terms of specific nutrients or factors. Protein intake and height have been associated in an earlier Chinese study<sup>19</sup>. The present study also adds weight to the importance of appropriate protein nutrition in infancy and childhood. The possibility that the whey protein fraction, as well as other insulinotropic peptides may be important and the stimulation of the insulin-like growth factor axis are all exciting areas of research, linked to the possibility that dairy products could lower the incidence of type-2 diabetes or promote fat oxidation. Of course, all proteins, or too much protein cannot be that good. The chapter by Lefebvre *et al.* deals with proteins, particularly gluten, which has been shown to be associated with type-I diabetes, while the intake of hydrolysed casein has been shown to be protective. These are experimental studies which now need good natural history epidemiology and such studies are underway. However, the review in this volume highlights potential mechanisms and is an encouraging read, particularly for those who would move beyond the current obsession with clinical trials and try to understand mechanistic biology.

Finally, the translation of basic science to bedside therapy is always welcome and even essential. There are so many claims that are made today, often based on inadequate science, that critical reviews of the evidence are always welcome. These should deal with claims of efficacy and safety, and current topics like intensive-care nutrition, immunonutrition and food allergies are represented

in this volume by balanced reviews. This volume of the *Annual Review of Nutrition* is, as always, a treasure of balanced compilations of relevant topics in nutrition, and certainly meets the needs of the Indian perspective.

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**Sen'trees' of Mumbai.** S. B. Chaphekar, C. S. Lattoo and Mugdha Karnik (eds). Centre for Extra-Mural Studies, University of Mumbai, Supported by ONGC. 2007. 304 pp. Price: Rs 2000.

When environmental problems linked to the declining green mantle are proving menacing to life on our planet, the release of the book under review by the Hon'ble Minister of Petroleum, Murli Deora is timely. The publication presented by the Vice-Chancellor of the University of Mumbai, Vijay Khole, on the occasion of the sesquicentennial year of the university provides a fresh approach to the arboreal sentinels of the metropolis. The genesis of the book lies in a course on 'tree appreciation' organized by the university under the leadership of S. B. Chaphekar. No claim is laid on covering all the ligneous species. Excluded are some showy flower-bearers, fruit trees, teak – the king of the forest and exotics like *Eucalyptus* and wattles. Included are over 100 species that have caught the fancy of the participants of the course for their sheer beauty and their cultural, historical, religious, literary and scientific significance.

Over 40 authors, among them eminent botanists, have contributed as many chapters. Beautiful photographs, a few (19) without description, enhance the value of the publication. The title is apt: Sen'trees', a pun, is a tribute to the greenery around us, to the lifeguards that shower upon us their generous bounty: lungs of the city that generate oxygen, sequester CO<sub>2</sub>, indicate and reduce pollution, control micro-climate, contribute to water cycle and storage, check erosion and bestow on us myriad benefits. The Sen'trees' are thus our saviours in the *Homo sapiens*-dominated ecosystems in a new geological era termed 'Anthropocene'.

Valuable information is included for a majority of species on world distribution, migratory routes in some cases, mean-