photosynthesis suggest that photorespiration may not be overcome by genetic manipulations. Genetic engineering of Rubisco cannot accomplish what several billion years of selection pressure have not.

Similarly, the existence of a non-phosphorylating bypasses, viz. rotenone-insensitive NADH dehydrogenase and alternative oxidase in an organelle that functions primarily in energy conservation was also considered to be energetically wasteful. However, persistence of these processes in plants despite million years of divergent evolution was indicative of their significance in plant metabolism. The mitochondrial alternative oxidase kinetics and regulation during plant development over the recent past signifies its metabolic importance. Induction by increased expression, activation and engagement of alternative oxidase under unfavourable environmental circumstances and during plant development also support changing priorities of plant mitochondria. Induction of mitochondrial alternative oxidase by nitrate in *Chlamydomonas reinhardtii* is indicative of its significance in the process of nitrate assimilation[4]. Analysis of mitochondrial mutants with impaired mitochondrial function has clearly indicated the significance of alternate oxidase in regulating the cellular redox homeostasis and protecting plants from varieties of biological stresses[5]. Moreover, transgenic plants with reduced alternate oxidase expression using antisense approach showed increased susceptibility to biological stresses[6].

It appears that Nature is the best judge to decide what to retain and what to eliminate and what appears to be energetically wasteful in the present time is future necessity looking to the global climate change and environmental uncertainty to which plants will be exposed.

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Linking Indian rivers

With reference to the meeting report[1] on linking Indian rivers, the total transfer of water in both Himalayan rivers component and peninsular rivers component is envisaged to be in the vicinity of 200 km^3 per year. Thus, it may be seen that this figure is insignificant in comparison to the total discharge available to flow down to Bay of Bengal. Moreover, the use of about 200 km^3 of transferred water will also generate considerable return flows to the natural drainage systems which will further contribute to the river discharge into the Bay of Bengal. Therefore, the apprehensions raised by the group of scientists on adverse impacts on monsoon activity due to diversion of waters through various links seem to be misplaced and misinformed.

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Ayurveda will survive till *Bharat* breathes

It is a cause for some conceit that four thousand years ago Ayurveda was already ancient[1]. Some date it more than 2000 years old[2], and some conjecture the interval of 600 BC to 800 AD as 'Ayurvedic period' and find Ayurveda the cradle of not only medicine but also of chemistry and science of plants and animals in India (P. C. Ray as quoted in ref. 2). Now, concern is raised as to how long Ayurveda will survive[3].

Ayurveda was discovered, nurtured and perfected in India (*Bharat*). This science of longevity was not just a collection of therapeutic recipes, but a framework, which defined conditions of sickness and connected them with healing practices. This science not only thrived in *Bharat* (India) but also influenced healing practices of many other countries. Strong interactions existed between Greeks and Hindus around 4th century BC, when the great Greek sage Appollonius of Tyana, came to India and carried back Ayurvedic knowledge from here. Buddhists took this knowledge to many countries and thus influenced the healing traditions of Tibet, Sri Lanka, Burma (Myanmar) and to some extent China[1].

Ayurveda was born along with *Bharateeya* civilization. In the course of time this country known as *Bharat*, became *Hindustan* and later transformed into *India* under colonial reign. Now, globally it is recognized as India. We proudly articulate ourselves as Indian and have blissfully adopted cultures, customs, practices, law, and the modern lifestyle under their influence and therefore, the modern medicine. But, there still exists *Bharat* in India and that is called rural India. It is this *Bharat* where *Bharateeya Chikitsa Paddhati* (Indian System of Medicine), Ayurveda still continues to provide healthcare to a large percentage – 70% according to some estimates[2]. Dhakal[3] asks, who opts for Ayurveda? And (s)he replies herself/himself that mostly chronic patients usually tire of long allopathic treatments and also advocates that Ayurvedic medicines have slow but definite effect[3]. In fact, it is this mystery of Ayurvedic or rather in a broad sense, Asian medicines that has brought the attention of Western science to do research on it. This attention will certainly bring fruits, flavours and the truth of Ayurvedic medicines and place it like allopathic medicines on a forefront of modern scientific platform. We should not worry about this development or feel hurt.

The philosophy, practice and the science of Asian medicine[4] and Ayurveda[5] are being unveiled utilizing modern scientific tools, techniques and the understanding and are being endorsed by modern science and its practitioners[6,7]. Therefore, if Western science and scientists are faster in their research[3], we should not worry about it.

We have been the cheap, talented and durable labour source in the past and also in the present. In this era of globalization and age of open economy, we are recognized as one of the largest consumer markets in the world. Therefore, whatever transformation and scientific improvement will take place in Ayurveda, it will come back in new form and we will applaud and accept it. Benefit to the suffering human society is of prime importance. As far as the name Ayurveda is concerned, it will remain alive as long as *Bharat* in India breathes.

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Omega-3-fatty acids in the diet

The commentary of Patil and Gislerød[1] provides useful information. However, the concluding remark about exploring alternate sources like algae and genetically engineered foods for omega 3-fatty acids since traditional sources are dwindling needs some clarification. Apart from fish, omega-3 fatty acid-alpha linolenic acid can be derived from vegetable oils such as soybean, mustard, canola, flax (linseed) and perilla. Unfortunately, mustard oil also has erucic acid, which is not good for the heart, and attempts are being made in India to genetically engineer zero-erucic-acid mustard oil. Flax seed is not being grown widely, and deserves attention from agriculture scientists. Perilla seed is available only in some northeastern regions. Currently, in India, soybean oil is the only easily accessible oil rich in omega-3 fatty acid. All other commonly used Indian oils like sunflower, safflower, groundnut, sesame, and rice bran are loaded with omega-6 fatty acid linoleic acid – also an essential fatty acid. For health, the ratio of omega-6 to omega-3 in the diet should be less than 10, but this is not possible with the presently available Indian oils unless blending is done. Indian diets tend to be very high in omega-6, omega-3 ratio. Fortunately, bound fat or invisible fat present in plant sources like green leafy vegetables (GLV) is rich in omega-3 fatty acid, linolenic acid. Increased consumption of GLV would not only supply precious nutrients like vitamin A (β carotene), vitamin C, and minerals but also healthy fat and one does not necessarily have to look for exotic sources. For most recent discussion on the subject please see ref. 2.

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Reply:

We agree with Bamji that soybean, mustard, canola, flax and perilla are sources of α-linolenic acid (ALA, C18 : 3 ω3), while sunflower, safflower, groundnut and sesame are rich in lineoleic acid (LA, C18 : 2 ω6). As referred in our commentary[1], ALA is the precursor of the eicosapentaenoic acid (EPA, C20 : 5 ω3) and docosahexaenoic acid (DHA C22 : 6 ω3) while LA the substrate arachidonic acid (ARA C20 : 4 ω6). From the point of view of human nutrition, the long chained EPA and DHA are more valuable, as these are the forms more rapidly incorporated into plasma and membrane lipids and produce more rapid effects than those by ALA. Humans are able to synthesize EPA and DHA from dietary ALA, and there is research[2,3] demonstrating this qualitatively. This conversion occurs through a series of desaturation and elongation pathways. However, Gerster[4] has suggested that the rate of conversion of ALA to long-chain metabolites is only ~6% for EPA and 3.8% for DHA in adults. Furthermore, with diet rich in ω6 polyunsaturated fatty acids (PUFA), these conversions may be reduced by as much as 40–50%. Recent studies also indicate that this conversion is inefficient[5,6]. There is a general agreement that the availability of EPA and DHA due to dietary intake and biosynthesis from ALA in many cases may be inadequate or imbalanced[7]. This may result in shortage of EPA and DHA as compared to the ω6 ARA. Scientists have therefore concluded that EPA and DHA should be obtained from the diet. With this background, we will explain briefly about the concluding remarks[1] concerning alternate sources of PUFA, viz. algae and genetically engineered foods.

The principal dietary source of EPA and DHA are marine fish. The global aquaculture production was 547 million tons in 2003 (ref. 8), and has been growing by roughly 9% annually, with trends towards intensification and greater con-