ment revenue as a result can only do more harm than good to scientific research in the country

The above items are worthy of examination in *Current Science* in the larger interests of country's development.

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Computer professionals/ students in USA

We must congratulate Pankaj Jalote for his painstaking efforts in carrying out the survey of Indian computer professionals/students in USA about taking up employment in India (*Curr. Sci.*, 1994, 66, 265–267). The survey gives a broad, but quantified picture of this highly professional sector of Indian experts working in US. There are, however, several questions which arise in our minds in this connection and we would welcome a response from the author or other readers.

The author says that 'there is a substantial pool of highly trained professionals in USA which can be tapped by the computer industry to alleviate the current manpower shortage and to bring in new expertise. . . .' While we agree with the second part, viz. bringing in new expertise, we are not quite sure if the US returned manpower will contribute substantially to alleviate the current manpower shortage. Isn't it better to devise ways and means to retain the excellent manpower that we graduate from the IITs and IISc? And, what is this manpower shortage, may we ask? Whose statistics are these? Why is it that for a small job of a research assistant, there are more than 150 applications from people with B. Tech. or higher degrees (of course very few or none from IIT/IISc)? Where are these jobs for highly qualified computer professionals?

A survey like this should have been accompanied by an assessment of the status of the computer industry and the job situation for skilled computer professionals in US. Is the US computer industry going through a recession? Or, is it going through a boom? Will this survey remain valid if the status changes drastically?

Our third question concerns the framing of the questionnaire and credibility of the responses. With directed questions like 'Is it necessary for the offer to be made before your return?', no wonder 75% said 'Yes'. What about the other 25%? If an offer is not necessary for their return, why have they not returned so far? There are also several other, slightly uncomfortable questions that need to be asked if we really must carry out a frank appraisal of the situation.

Does an engineer become better qualified simply by virtue of his being in the US for a few years? Why should the Indian industry give special consideration to someone simply because he is a US-based professional, unless he is outstanding and really deserves it as a professional? Does the answer to this have something to do with our colonial past? We wonder!

Many of those responding (about 46%) have not yet got hold of a green card or a secure regular job. Even so, what fraction of them would actually take the plunge to return when the crucial moment for decision comes? A survey of past experience on this may show the fraction to be negligibly small!

Even from those who return, how many would not start thinking of going back to the US as soon as the opportunity presented itself? This may be difficult to answer, but perhaps looking at past experiences may again hold a clue!

The point that we are trying to make here is: how many of those going abroad are committed to the cause of their own country? We are sure everybody is, at least to some extent, in some sentimental and emotional way. But is the commitment strong enough to take a plunge without the need of holding out an extraordinary treatment for them? If so, who prevents them?

The statement that most large computer companies in India offer exciting work, career and travel opportunities is, to say the least, a loaded one. Has the author or someone else carried out a survey of this aspect? Is our industry really doing hi-tech work?

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Amber

The Editor's comments ('In this issue' p. 393, 25 March 1994) tempted me to read the article 'Fossils in Amber' by G. O. Poinar, Jr (*Current Science*, 1994, 66, 417). It was interesting and informative. This article is timely particularly as the film *Jurassic Park* is currently being exhibited in India. It is astonishing to know that the Amber of millions of years old preserves tissue and even DNA of embedded organisms.

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Nobel's centenaries and their significance

The topmost prize in the modern world is 'The Nobel Prize'. It originated from the will of Alfred Bernhard Nobel, the Swedish chemist and industrialist on 27 November 1895. The foundation to award the prize was subsequently established in 1900 and the awarding[1, 2] of prizes started from 1901. These events anticipate their centenary in the coming years, i.e. on 27 November 1995, the years 2000 and 2001 respectively. Interestingly, the will of Nobel states that prizes have to be awarded to those who, during the preceding year, shall have conferred the greatest benefit on mankind.

In fact, Nobel's centenaries can act as the significant yardstick to measure in reality, the greatest benefits which are conferred by Nobel prizes, on mankind since 100 years. Nobel prize is awarded in different fields of knowledge, namely physics, chemistry, physiology or medicine, literature, peace and economic sciences (from 1969). On the other hand, prizes alternative to Nobel prize are evolved in recent years namely the Right Livelihood Prize in Sweden and Anti-Nobel Peace Prize in Libya. Concerned institutions and individuals have the task of celebrating these events in time.

1. Alfred Bernhard Nobel, by Torsten Althin, in *Dictionary of Scientific Biography* (Editor-in-chief Charles Coulston Gillispie), Charles Scribner's Sons, New York, USA (C) 1974, Vol. X, pp. 132–133

2 *The World of Learning*, Europa Publications Ltd, London, England (C) 1987, 37th edn, p 1171

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SCIENTIFIC CORRESPONDENCE

Sugarcane: A renewable natural agricultural resource

Sugarcane has held the attention of many from monks to monarchs. Legend has it that Lord Buddha was born to sugarcane. The crop is intimately associated with Indian mythology[1]. The earliest reference to sugarcane is in Atharvaveda (5000 years ago) and cane planting was well established in the Indus Valley. Further confirmation as a closely managed crop by the natives comes from the notings of Alexander in his eastern expedition. As a cultivated crop it travelled from India to Spain and thence to Africa. Columbus introduced it to the New World in 1493. It supports a strong industry and a significant part of the economy in many countries; a crop that changed the demographic character of many a country during colonial times.

Sugarcane is eco-friendly. It alters the microclimate, perhaps reduces the green house effect by more CO_2 fixation and O_2 emission. The production potential of sugarcane is very high due to its distinct anatomical and biochemical features associated with C_4 plants. These include, interalia, twilight photosynthesis, high specific leaf weight, porocity and LAI. Hence, a theoretical maximum cane yield is assumed to be 129 g m^{-2} d^{-1} or 470 Mg ha^{-1} yr^{-1} (ref. 2). This plant was so far regarded as a *monolithic* (sugar) crop. But it deserves a niche as a multiproduct commodity providing food, fuel, fibre and fertilizer. The crop is a source of at least 38 byproducts having a value of *US~$ 8000 per ton of raw material*[3]. Its dry biomass yield potential at 60 Mg ha^{-1} is unmatched by any other agricultural crop.

In sugar production nearly 60% of centrifugal sugar comes from sugarcane and the rest from sugar beet. Besides, low grade non-centrifugal sugar is consumed in Asia, Africa and Latin America. Interestingly per capita sugar consumption reflects geo-cultural preferences. A consumption of over 50 kg is observed in Cuba, Brazil, USA and Australia, while the lowest (2 kg) is in Burundi and Rwanda in central Africa. The World's average per capita sugar consumption is static at 20 kg. It is difficult to prognosticate the future pattern of sugar consumption. Increasing health concerns point to an era of reduced sugar consumption. Even criminal behaviour is associated with sugar consumption. A change in lifestyle would reduce per capita sugar consumption. But *nutritional gurus are* now convinced that except the dental caries sugar consumption has no health hazard. It is palatable, safe and nutritious. The bottom line is 'eat sugar with pleasure but with a measure'. The greatest challenge to natural sugar is from low calorie table top sweeteners like Aspartame, Acesulfam-K, etc. They are aptly called the 'Nutritional terrorists'; they are expensive and leave bitter after taste. Natural sugar will therefore be prized and the artificial sweeteners would fail to replace it.

The energy cane is essentially a management concept where a package of anatomical, physiological and agronomic features is tailored towards growth[4]. It is theorised that the long internodes of cane are like an 'Open bag' of sugar where fermentable solids are available for growth. A distinct feature of energy cane is its 'invasiveness' and 'weediness'. Other special features of energy cane are expansive green leaf canopy, propensity of tillering, active crown leaves, stay green and extended root proliferation[4]. The agronomic package includes: closer spacing (0.45–0.60 m) with a millable cane population of over 30 m^{-2} and high N rates (400–450 kg ha^{-1}). The most promising energy cane cultivar is US 67–22–2 (*S. spontaneum* hybrid). We have observed that energy cane (cv Co 62175) under closer spacing (0.45 m) can yield 6000–8000 l ha^{-1} ethanol as against 2000 l ha^{-1} by sweet sorghum[5].

A futuristic terminology for sugarcane would be fibre cane since the primary product would be lignocellulose, i.e. fibre. Fibre is defined as the residue of sugarcane (fibrous or not) after crushing in the mills and is termed as bagasse. Bagasse conservation becomes an over-riding concern to produce adequate lignocellulose and also be used as in-house boiler fuel. The calorific value ranges from 4550 to 4660 cal kg^{-1}. The earliest record of bagasse as fuel dates back to 100 AD[1]. Globally bagasse production is estimated at 280 million tons with Asia and South America contributing 70% of total production. Assuming a 5% saving in bagasse for paper pulp, 2 million tons of bagasse pulp can be obtained[6]. Varieties differ with regard to fibre