Biological sciences: Raghavan Varadarajan, Indian Institute of Science (IISc), Bangalore and Amitabha Mukhopadhyay, National Institute of Immunology, New Delhi.

Chemical sciences: Tushar Kanti Chakraborty, Indian Institute of Chemical Technology, Hyderabad and Murali Sastry, National Chemical Laboratory, Pune.

Earth, Atmosphere, Ocean and Planetary sciences: G. S. Bhat, IISc, Bangalore and Sankar Kumar Nath, Indian Institute of Technology (IIT), Kharagpur.

Engineering sciences: Ashutosh Sharma, IIT, Kanpur.

Mathematical sciences: Dipendra Prasad, Harish Chandra Research Institute, Allahabad.

Medical sciences: Sunil Pradhan, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow.

Physical sciences: Avinash Anant Deshpande, Raman Research Institute, Bangalore and Mohit Randeria, Tata Institute of Fundamental Research, Mumbai.

Nirupa Sen

USA not to ratify the Kyoto Protocol

President Bush of the United States of America had rejected the Kyoto Protocol in March 2001. Little has changed since that time in the stand taken by the US Government. Harlan L. Watson, Senior Climate Negotiator and Special Representative, US Department of State reiterated this line in his press briefing with journalists at the American Embassy, New Delhi on 1 October 2002. Watson said, 'There is no way we can meet the commitments. No apology on our side. We will not be ratifying the Kyoto Protocol at least for the first commitment period. Will there be a new Kyoto Protocol that be decided later in the future, it can be considered then'.

In order to halt global warming due to emissions from greenhouse gases, under the Kyoto Protocol, 38 industrialized nations have agreed to cut their emissions; however, the US refused to sign, arguing that the Protocol's binding commitments would harm their economy. In the US, climate change policy unveiled by President Bush on 14 February 2002, the US would cut greenhouse gas emissions by 18% over the next decade by cutting the greenhouse gas emissions intensity by the amount it emits per unit of economic activity. Watson said that over the next ten years, the US would avoid more than 500 million metric tons of emission, which would mean taking one out of three cars off the road. The new US climate change policy to slow the growth in the US greenhouse gas emissions also includes use of clean energy technologies and producing cars with better mileage. The US Government has set aside $ 47 billion for sequestration of carbon and conservation on its farms and forest lands. The US would also lay emphasis on long-term investments on advanced technologies. In the FY 2003, the US would invest $ 4.5 billion in climate change-related activities, of which $ 279 million will be for international activities, an increase of 29%, the latter towards enhanced support in the developing world and for bilateral international cooperation.

Both the US and India have agreed to continue their cooperation in energy and environment, especially in areas such as clean and renewable sources of energy, fuel cells, photovoltaic technology and climate modelling. India is to host the Eighth Session of the Conference of Parties to the Climate Change Convention under a Host Country Agreement signed between the Government of India and the UN Framework Convention on Climate Change to be held between 23 October and 1 November 2002.

While answering questions raised by the press, Watson said that 20% of the US power is from nuclear energy and one of the major issues causing public concern is nuclear waste management, adding that 'quite frankly, nuclear power is not economic'. When queried on the expectations the US had on developing countries, he hastened to add that 'this administration is not asking any developing country to take on a commitment, in regard to reducing greenhouse gas emissions'. When asked by the press whether the US felt alienated for not ratifying the Kyoto Protocol he replied, 'Not really, friends in Australia have

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RESEARCH NEWS

Cloning the fish

T. J. Pandian

In a seminal publication, Brenner *et al.*[1] showed that the coding sequences of the puffer fish, *Fugu rubripes rubripes* are about 7.7 times more enriched than those of human or mouse. Hence, the Fugu genome is unexpanded and has never acquired large quantities of junk DNA. Correspondingly, one will have to put in about one-seventh less laboratory work than required for the human genome[2]. Thanks to the explosive research activities in zebrafish, *Danio rerio* and medaka, *Oryzias latipes*, we however seem to know a little more about the genome of these fishes. Among these, zebrafish has become a more important model system for the study of vertebrate development because of its ease of use in genetics[3], embryonic manipulation[4] and transgenic analysis[5]. Although zebrafish cell cultures have been shown to display some characteristics of embryonic stem cells, it remains to be seen whether these cells will contribute to germ line transmission after long-term culture.

Non-visibility of the egg nucleus of many fishes renders them not amenable for nuclear transplantation, like that achieved by Wilmut *et al.*[6]. In the 1960s attempts were made to transfer nucleus of uncultured blastula cells into the non-enucleated eggs of loach[7]. Like the Russians, the Chinese have also attempted to study the nucleocytoplasmic relation in fishes. Tung and his colleagues[8] at the Institute of Developmental Biology, Chinese Academy of Sciences, Beijing contributed a series of publications to report the successful transfer of nucleus of fertilized egg of one carp species to that of another. In 2001, Japanese scientists like Wakamatsu *et al.*[9] have successfully restored diploid and fertile medaka by nuclear transfer using blastula cells as donors. Obviously, the nuclei prepared from fresh blastula cells can be reprogrammed in fish to support embryonic and adult development. In an epoch-making publication, Lee and his Korean colleagues[10] have recently demonstrated the successful cloning of fertile zebrafish from long-term cultured cells, a technology that will allow targeted genetic manipulation in zebrafish.

The success of Lee and his colleagues in cloning the zebrafish is based on the development of two important techniques: (1) Using Hoechst staining, they could visualize the relative size and location of the pronucleus in an unfertilized egg of the zebrafish. Using the second polar body as a reference, the pronucleus was aspirated with a small amount of cytoplasm just underneath the polar body. (2) Enhancing the visibility of the nuclei of donors, namely blastula cells and embryonic fibroblast cells by infecting these cells with *GFP* reporter gene. *GFP* enhances the visibility of the nuclei under fluorescent light and helps to track the destiny of the transferred nucleus during embryonic development and in adult. Lee *et al.* generated two sets of donors, the first one using blastula cells and the second using embryonic fibroblast cells. Euploidy of the embryo was confirmed by karyotype and Southern analysis. These clones showed normal growth, aging process and fertility. Only 2% of the total number of eggs used for nuclear transplantation attained sexual maturity, and their F_1 and F_2 progenies continued to express *GFP* in a pattern identical to the founder fish. Incidentally, Wilmut and his collaborators at the Roslin Institute, Edinburgh had also used 400 and odd surgically recovered unfertilized eggs and 277 reconstructed eggs to generate only one 'Dolly'. Therefore, Lee *et al.* may legitimately claim that they are the first to achieve cloning the fish, a lower vertebrate.

In India, beginnings have been made to induce androgenesis in rohu, *Labeo rohita* at the National Bureau of Fish Genetic Resources, Lucknow and transgenesis in catfish, *Heteropneustes fossilis* at the Centre for Cellular and Molecular Biology, Hyderabad. At the Madurai Kamaraj University, sexually mature rosy barb, *Puntius conchonius* has been restored using its preserved sperm at – 18°C (ref. 11) and genome-inactivated surrogate eggs of the tiger barb, *P. tetrazona*[12]. This kind of interspecific androgenic cloning may not only restore an endangered fish species but also mass produce, say, carp seedlings almost throughout the year using eggs of the undesired tilapia. Notably, it is the untiring efforts of our Asian colleagues from China, Japan, Korea and sustained support by government agencies that have led to this spectacular achievement of cloning the fish. Indian scientists at Lucknow, Hyderabad and Madurai must soon place India in the map of cloning the fish.

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Oscillating neutrinos and the sun

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Astrophysicists (and cosmologists) use the results of physicists from other branches, in their work. Once in a while they are also able to help out the physicists by providing a testing ground for their theories. Recent results from a set-up in Ontario, Canada to detect neutrinos from the sun have provided one such occasion which has been very satisfying for both astrophysicists and particle physicists.

Energy production in stars has been under study for more than a hundred years. The progress can be traced through a series of classical books by Eddington, Chandrasekhar, and Schwarzschild[1]. The role of nuclear interactions in energy production was understood in the late 1930s when Hans Bethe and others suggested the possible nuclear reactions that could produce the energy. Bethe received