dard with that of *Codex* is being followed accordingly, Chakraborty added. He informed the audience that 'The Food Safety and Standards Act 2006' has already been approved and signed by the President of India on 23 August 2006. As a result, consumer safety will be ensured in a better manner through food safety management systems and setting standards based on science and transparency, it will also meet the dynamic requirements of the Indian food trade and industry and international trade.

In Technical Session III, K. Chandralekha (KSP Mahila University, Tirupati) spoke on 'Impact of radiation processing on nutrient composition of selected health mixes'. Food irradiation envisages a concept of food processing and preservation. Irradiation can be used to pasteurize food without causing changes in its freshness and texture. She further stated that health-mixes were being developed in the laboratory to provide protein with high biological value, for health promotion and disease prevention. These health-mixes when subjected to irradiation treatment, did not suffer any significant change in their nutrient composition. Hence radiation processing technology would help traders and other users as a modern tool to preserve their precious produce.

In Technical Session IV, Pratap Chakraborty (Jadavpur University) spoke on 'Food safety and quality'. India is the world's second largest producer of food and has the potential to become number one in the course of time with sustained efforts, according to Chakraborty. Regarding food safety, he said that food processed under unsanitary conditions is not considered safe by many importing countries. CGMP (current good manufacturing process) helps prevent this problem through appropriate maintenance, cleaning and sanitizing. The purposes of quality control are: (i) protection of nutritional value of constituents, (ii) protection of customers from dangers of contaminated food and ensure that they get the weight and quality of food that they pay for, (iii) prevent cheating by suppliers (e.g. stones in raw materials), damage to equipment and false accusition by middlemen, customers or suppliers, and (iv) to ensure that food laws operating in a country are complied with. Some standard guidelines must be followed according to ISO, CODEX, etc. for maintaining the quality of the product, Chakraborty concluded.

Minakshi De, 35, Garpar Road, Kolkata 700 009, India.
e-mail: amitkde@satyam.net.in

MEETING REPORT

Alternatives to the use of animals in research, testing and education*

The words of Mahatma Gandhi that 'the greatness of a nation and its moral progress can be judged by the way its animals are treated', set the stage for the First Indian Congress on Alternatives to the use of Animals in Research, Testing and Education. The Congress witnessed over 400 participants. T. Ramasami (Secretary, Department of Science and Technology) inaugurated the proceedings. The inaugural session had presentations by P. C. K. Nayar (Medical Council of India) on alternatives to the use of animals in medical education and by Vasantha Muthuswamy (Indian Council of Medical Research) on alternatives to the use of animals in medical research. The Congress had three lecture and seven workshop sessions.

The issue of alternatives to the use of animals in research and testing is indeed not new, and in many ways continues to be contentious. The first protests for animal protection began in England during mid-nineteenth century, in which activists opposed all forms of animal research. The protests gained momentum during the seventies, and many believe that the work of Peter Singer entitled *Animal Liberation* in 1975, revived the call for animal protection. A few of the presentations are highlighted here. Alan M. Goldberg (John Hopkins University, Baltimore) spoke on 'The science of alternatives', which detailed the three Rs, i.e. replacement, refinement and reduction of alternative and humane science. While exploring the societal expectations of animal use in science, Goldberg addressed the importance of the three Rs. The Bologna Declaration of 1999 signed by 29 European countries was a watershed event for the issue of animal use and this declaration paved the way to the alternate animal testing protocol, viz. the three Rs. The concept, developed by Russell and Burch advocates that, animal testing protocols conform to the three Rs. Replacement of animal testing by alternative methods is the most radical of the methods proposed, although a differentiation is made between absolute and relative replacement. Refinement on the other hand, is the subtle approach which advocates the reduction of incidence or severity of distress experienced by laboratory animals. Reduction entails obtaining precise information with animals through the use of well-designed, well-conducted, reliable experiments that do not involve endless repetition of the same tests.

Thomas Hartung (European Centre for the Validation of Alternative Methods (ECVAM), Ispra) presented some of the key initiatives in his presentation entitled 'Europe goes alternative, contributions to reduce animal testing'. ECVAM was created in 1993 following the European Directive 86/609/EEC in 1991, and the institution is a forerunner in furthering alternative approaches to animal testing.

The field of alternative is currently driven by demands made by two major sectors, viz. consmetics and chemicals. While the 7th Amendment made by the European Commission in 2003 foresees

*A report on the First Indian Congress on Alternatives to the use of Animals in Research, Testing and Education, held between 29 and 31 January 2007 at Sri Ramachandra Medical College and Research Institute, Chennai, and jointly organized by the International Centre for Alternatives in Research and Education, Sri Ramachandra University, Chennai and the International Institute for Biotechnology and Toxicology, co-sponsors included amongst others, the Winsome Constance Kindness Trust, The Medical Council of India and the Indian Council of Medical Research.

the phasing-out of animal experiments in cosmetics within 10 years, the legislation for chemicals (REACH) is only emerging since it anticipates data requirements for more than 30,000 substances produced at levels above 1 ton/yr. Horst Spielmann (ZEBET, Berlin) detailed the 'Mission and accomplishments of ZEBET', which is the German centre for documentation and evaluation of alternative methods. Spielmann's presentation included an overview of various measures and institutions established globally on alternative methods. For instance, following the European Directive 86/609/EEC, the European Centre for the Validation of Alternative Methods was established in Italy in 1993. ZEBET, the German centre for documentation and evaluation of alternative methods, was established at the Federal Health Institute, Berlin in 1989. FRAME, the centre in the UK and the National Centre for Alternatives in the Netherlands were established during the same period. The Interagency Coordinating Committee on the Validation of Alternative Methods was established in 1997. In 2004, the UK National Centre for the three Rs (NC3Rs) was established to focus on refinement and reduction protocols. Outside Europe, in USA, several institutions to promote alternatives to the use of animals have been established. For instance, the Johns Hopkins University Centre (CAAT) established in 1981. More recently, Japan established the Japanese Centre for the Validation of Alternatives in 2005. The mandate of the validation centres includes establishment of a database and information service on alternatives at the national and international level; to develop alternatives in accordance with the concept of the three Rs; to fund research on alternatives, to coordinate validation studies; to cooperate with national and international funding agencies and other validation centres, and to provide a forum for sharing data and information on alternatives to animal testing.

Coenraad F. M. Hendriksen (the Netherlands Vaccine Institute (NVI), Bilthoven) spoke on the application of the three Rs concept in quality control of vaccines, in which he highlighted the ongoing work at NVI on the possibilities of using the three Rs to minimize the use of laboratory animals in vaccine quality control. Traditionally, vaccine quality control requires a large number of animals with higher levels of pain and suffering compared to other uses of laboratory animals such as toxicity testing or cancer research. The new strategy in vaccine control that lead to an almost total phasing-out of animal use is 'consistency approach'. This approach relies on non-animal test models and could include both physicochemical methods such as HPLC, as well as immunochemical methods such as biosensor analysis or epitope mapping using monoclonal antibodies.

Joseph Bressler (Johns Hopkins University) presented the challenges in developing *in vitro* models for studying the blood–brain barrier (BBB). This is a physical barrier that prevents polar chemicals and large molecules from entering the brain; and the basis of the physical barrier is tight junctions expressed by endothelial cells lining the capillaries. Because high amounts of glucose and other requisite chemicals required by the brain would be impeded by BBB, the brain capillary endothelial cells express a broad range of transporters for different nutrients. The BBB is also a metabolic barrier, and the major role here is to prevent the entry of amphipathic molecules. Despite tremendous efforts in establishing models for determining the permeability of the BBB, *in vivo* models suffer from several problems such as cost and availability of reagents. The challenge therefore is to attain an impermeable cell monolayer that mimics brain capillary endothelial cells *in vivo*.

Presentations on education, awareness and capacity building included talks by Maria Eugenia Webb (University of Lisbon) on tapping emotional literacy as a means to teach alternative methods in life sciences; Massimo Tettamanti (Atra, Lugano) on an interactive database of alternative methods in education, and U. S. Gadgil (Johnson and Johnson Medical, India) on the role of simulators in surgical education. The proceedings of the Congress culminated with a panel discussion on 'Taking forward the science of alternatives in India', resulting in a set of recommendations which the organizers propose to share with the apex educational and research bodies of the country to take forward the initiative.

Jayshree Vencatesan (*S. Ramaseshan Fellow*), Care Earth, No. 5, 21st Street, Thillaiganga Nagar, Chennai 600 061, India. e-mail: jvencatesan@careearth.org

MEETING REPORT

Biocontrol and biotechnology*

In the Fourth International Symposium on 'Biocontrol and Biotechnology' (Biocontrol in the Genomics Era) held recently, there were about 190 delegates from across the country and 10 delegates from China, Thailand, Germany, Japan, South Africa and the Philippines. The programme committee considered 185 abstracts, of which 20 were scheduled for plenary talks in five sessions, 77 for oral presentations in eight parallel sessions and 88 poster presentations. The symposium began with the Presidential address by G. Thygarajan (Former Director, CLRI, Chennai). He appealed to the scientific community to shoulder the responsibility of convincing the endusers (farmers) by making them aware of the advantages of GMOs (genetically modified organisms), transgenic crops and animals. This was followed by a plenary lecture by K. Dharmalingam (Madurai Kamaraj University, Madurai) entitled 'Biotechnology enterpreneurship in India'. He pointed out the critical issues, the required infrastructure and the role of entrepreneurs. He also emphasized that universities and other research institutions with their own policies and guidelines should strive to encourage entrepreneur-partnership with scientists.

Joseph Thomas (Former Adviser, Indian Institute Technology, Madras) spoke on 'India as an emerging superpower and

*A report on the International Symposium on 'Biocontrol and Biotechnology' organized by the PG and Research Department of Zoology and Biotechnology, Lady Doak College, Madurai from 27 to 29 November 2006.