Table 1. Summer fellowships of the Academy

Subject	Students			Teachers		
	Applications received	Offered	Availed	Applications received	Offered	Availed
Biology	600	55	52	60	14	13
Chemistry	200	19	15	35	15	14
Physics	187	16	12	32	6	6
Engineering	194	9	6	14	1	1

lal, University of Calicut has made a seminal contribution by providing a translation and an annotation of modern botanical equivalents. Mohan Ram also spoke of the lotus, carbon-dated to be about 800 years old that found its way from a lake in Mongolia to the West, and a *Ginkgo biloba* species that sprouted even after its environment was destroyed with the nuclear bomb on Hiroshima, showing the tenacity to survive.

Kasturirangan, while addressing the press, spoke of ISRO's commitment to the NE with the setting up of a Space Applications Centre in Shillong about three years ago that entailed unique recruitment procedures of drawing staff from the region itself that has proved successful. EDUSAT, a satellite devoted exclusively for education, would provide a further step in space science promotion, when operational especially in the NE region where he said 'a lot needs to be done'.

Invited teachers attending the meeting were mainly from the east and NE regions of the country, as well as about eighty participants deputed by universities in the NE. The Science Education Panel of the Academy appraised the invited teachers of the forthcoming courses due to be held. These include:

- Physics of the atmosphere and the ocean, December 2003, IISc Bangalore.
- Refresher course in mathematics, December 2003, Berhampur University, Berhampur.
- Frontiers in inorganic chemistry, December 2003, IIT Kanpur.
- Lasers and applications in chemical processes, January 2004, University of Madras, Channai.

The Academy has offered a large number of summer fellowships (see Table 1).

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Novel therapeutics*

Globalization of drug market and post-GATT and TRIPS scenario have made drug discovery a prime area of research in the pharmaceutical industry. The concept of individualized medication and molecular and genetic approaches to fight diseases has made drug discovery a demanding area of research. To have a closer look into some of the challenges offered by this field, a two-day workshop was recently organized. The workshop was attended by around 60 participants.

The keynote address of the workshop was delivered by V. Sudarsanam (PERD Centre, Ahmedabad). According to him, drug discovery includes everything from disease mechanism, validation of targets, lead optimization, new chemical entities to formulations. He further added that the planning for new block-busters should not overlook the importance of older innovative methodologies, knowledge, techniques and science. He emphasized the role of team work and multidisciplinary endeavour.

Drug discovery in the post-genomic era, technology trends, international industry, Indian opportunity and various business models were the content of the talk delivered by Sanjay Martis (Nicolas Piramal). 'Fail fast and cheap' in drug discovery was the focus of the deliberation by Vadlamudi Rao (Suven Pharma). He emphasized on early ADMET studies for evaluation of a compound which can help in faster process of lead generation and lead optimization, which in turn can reduce the expenses and time between discoveries and marketing of the drug. Potential of structure-based drug design in the discovery of new chemical entities was discussed with many successful examples by V. M. Kulkarni. The importance of cytochrome p450 in drug metabolism and how the capacity of CYP enzyme system to metabolize a drug varies with each individual was discussed by Harish Padh (PERD Centre). Rationalized therapy, pharmacogenomics and its utility in therapeutics approaches with the case study of herceptine, omaprazole and paroxitine were discussed in detail. Citing various examples of new uses of old drugs like antithrombotic property of aspirin for prevention of heart attacks and cerebral stroke, revival of thalidomide for treatment of lepra-reaction, use of carbamazepine in the management of depressive psychosis, use of chloroquine in rheumatoid arthritis, Ashok Batham (Sun Pharma) suggested a new path of drug discovery which starts from the clinic and returns to the clinic in better form with new promises. Insulin resistance in type II diabetes, etiology of insulin resistance, treatment of type II diabetes, limitations of current drugs available for diabetes and newer activity-based approaches to design oral antidiabetic drugs with many pharmacokinetic parameters were the main issues discussed by B. B. Lohray (Zydus Research Centre). The main target for drug discovery in the area of tuberculosis is to reduce the duration of therapy which could be possible with the search for new targets, new *in vivo* and *in vitro* bioassay methods, and using resistant forms according to Ramesh Jayaram. Light was

*A report on the two-day workshop on 'Challenges in the Development of Novel Therapeutics' organized during 11–12 October 2003 at the B.V. Patel PERD Centre, Ahmedabad.

also thrown on various challenges in the discovery of novel drugs in tuberculosis, along with pharmacokinetics, PK/PD parameters for efficacy prediction, kill kinetics and animal model for tuberculosis.

The second day of the workshop started with a detailed discussion by B. Gopalan (Glenmark Research Centre) about the therapeutic potential of phosphodiesterases inhibitors. These are the family of enzymes responsible for metabolism of cyclic nucleotides, cAMP and cGMP which are intracellular second messengers that mediate many physiological processes. Dislipidemia is a major risk factor in the development of atherosclerotic cardiovascular diseases. Lipid regulation is proved to be effective in a variety of clinical conditions like coronary heart diseases. R&D in this area and developed novel therapeutic options have played a major role in understanding the pathophysiology of lipid-related disorders and in establishing the link between cardiovascular disease and lipid profile. This was the essence of the talk delivered by V. V. S. Swaroop Kumar (Glenmark Research Centre). Obesity is a chronic metabolic, stigmatized and costly disease opined Sreedharaswamy (Quest Institute of Life Sciences). He discussed in detail obesity management, health risk due to obesity, genetics of obesity, its molecular mechanism, treatment and the market potential of drugs related to this. In addition to this, he highlighted new therapeutic strategies for the treatment of obesity and new targets for anti-obesity drugs. Emerging need for the development of novel antibacterial agents and related strategies were covered by Mahesh Patel (Wockhardt Research Centre). He elaborated on antibiotic resistance, susceptibility shift, main antibacterial classes and their targets. He questioned the statement by US Surgeon General (1969) that 'The war against infectious diseases has been won'. Allergy, the most common ailment of the 21st century, its etiology, biochemical events and design of related therapies were the focus of the deliberation by C. T. Rao (Sun Pharma). Various steroidal drugs and their mechanism of action, new anti-inflammatory drugs and monoclonal antibodies were also included in the talk. Nitric oxide is a wonder molecule; a balance of it in the body is crucial. The harmful and beneficial effects of NO and different categories of drugs which donate NO were discussed in detail by Kamala Vasu (PERD Centre). Special emphasis was given to NO.NSAIDS class of drugs.

Concluding remarks were given by Sudarsanam.

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In vitro fertilization in India*

In vitro fertilization (IVF) and embryo transfer were successfully introduced to treat human infertility in 1978 and the world's first test-tube baby, Louise Brown, was born in the UK on 28 July of that year. Exactly 67 days later, Subhash Mukerjee announced the birth of the world's second test-tube baby, Kanupriya, alias Durga, on 3 October 1978 in Calcutta. Both these announcements were received with skepticism and the scientists responsible for these births were severely criticized. Nevertheless, the British team carried on with their work and produced several more test-tube babies. In marked contrast, the Government of West Bengal proscribed Mukerjee from carrying out further work in this area and he was transferred to an eye hospital that did not have any facilities to enable him pursue his work.

Mukerjee could not publish all the details of his work. He was asked by the Government to submit details of his work, which he did. He also stated that he wished to carry out further work so that he could validate and standardize the various procedures he had used in his first and only success. His being prohibited to carry out further work by the Government of West Bengal and his untimely death left big lacunae in our understanding the rationale behind the techniques he used. However, in the report he submitted to the Government of West Bengal, which was signed by all the three investigators that were involved in carrying out this procedure, some details were given. These details clearly indicate that Mukerjee's techniques were different from those used by the British team (Table 1).

IVF in India would have continued to languish but for the support from the ICMR to support IVF-ET that led to the birth of Harsha in Mumbai in 1986. Several other clinics soon followed suit and today there are reportedly over 200 clinics claiming to offer IVF all over India. A million test-tube babies have reportedly been born all over the world.

IVF has turned out to be a major scientific achievement of mankind during the last century. It has not only opened out novel ways of treating infertility involving third and sometimes fourth party parenting a child in a tandem manner, but also advanced our understanding of basic biology and pathology of human repro-

Table 1. Salient differences between UK and Indian approaches to IVF in 1978*

The UK approach	The Indian approach
IVF performed in a natural cycle	IVF after gonadotropin stimulation
Ovarian response monitored by estimating urinary LH	Cervical mucus studied to monitor ovarian response
Embryo cultured in synthetic medium	Embryo cultured in uterine mucus
Embryo transferred in the same cycle	Frozen thawed embryo transferred in the next cycle

*Based on published data by Edwards and Steptoe and on the Report submitted to the West Bengal Government by Mukerjee and his team in 1978.

*Based on the commemoration of the Silver Jubilee of IVF in India held in Bangalore on 3 October 2003.