

was no longer seen as a prestigious profession in India. Varadarajan pleaded for improving the quality of Academy's publications. He said they should be sought after and quoted by scientists everywhere. He felt that our methods of reaching a worldwide audience were poor. Varadarajan suggested that the Academy do away with the sectional committees as science had become borderless. Rao would not mind too if the sectional committees were abolished.

Rao admitted that it was becoming increasingly difficult for Indian scientists to do good experimental work and publish in excellent journals. Visibility of Indian science, he said, was at a very low ebb—just like Indian sports. Both of them felt that healthy media could be an ally of science in India. Compared to the other two Academies, the Indian Academy is young—in terms of the average age of the Fellows. Rao would like it to remain that way. As Ramaseshan pointed out, to recognize potential winners, well before they actually produce their best work, should be the hallmark of an academy. Indeed that was what Raman did all the time at a success rate of greater than 95%, he said. Ramaseshan's priority would be 'to think and rethink our journals' and make them reach all universities and students so that Indian boys and girls would be excited to do science at international levels of excellence. That, he felt, was more important than even making our journals 'international'. He was sorry that unlike Raman, Indian scientists of this generation, were lazy when it came to writing down what they did. Was it not our duty to propagate knowledge, he asked.

Satish Dhawan was distinctly dissatisfied with the Indian scientific community. He asked what had the community done in matters of grave

concern to the nation. Don't we have a view on issues affecting the Indian people? Science in India could thrive only if India prospered, he thundered. What have we done about our rag-picking children? Have we expressed our view on the Mandal Commission Report? Or, do we have a view at all? In his view, since Independence science has been getting tremendous support, perhaps even illegitimate support that was not earned. Inaction is our worst enemy, he said. His priorities are to take a long term view of history, to act and do things in a way that would make us be proud and live a civilized life in a free India.

T. S. Sadasivan, the octagenarian botanist, was concerned about the decline in standards of education, the mushrooming of correspondence courses and the poor quality of teachers. He suggested that the Academy should bring out books like the Nuffield Foundation books and the Colorado series. Unless basic science teaching at the school level is strong, one cannot expect the superstructure to be strong. He suggested that the Academy should bring out a set of books on the history of twentieth century science, which could serve as a springboard on which school science education in this country could rest. He would be happy to know that C. N. R. Rao has assembled a team of chemists to write a book—not a textbook—calculated to excite the imagination of our school children.

Obaid Siddiqi, who spoke the least, drew attention to the fact that the same problems keep cropping up again and again. I thought he meant that the Academy should go beyond mere discussion and act. Action needs committed people. That was what Roddam Narasimha, the outgoing President, asked for when he suggested that Fellows should volunteer to work for the goals of the Academy collecti-

vely and individually. The strength of the Academy is after all dependent on the commitment of the Fellows and the resources available—probably more on the commitment than on the resources, I think.

One of the tasks the Academy had initiated in its Diamond Jubilee year was to look at the quality of education and examine ways to improve it. A panel with N. Mukunda of the Indian Institute of Science as chairman had prepared a position paper and the paper was circulated to the Fellowship. While one is happy to know that the Academy is taking serious interest in issues such as the quality of education, one also wonders what action it is taking in areas of its core interest such as improving the quality of research, improving the quality of peer review and publications, and attracting more scientists, young and not so young, to its own meetings. When the President, Narasimha, called out names of the Fellows for their customary introduction to the audience many Fellows from Bangalore had not turned up, and my neighbour, a newly elected Fellow, I guess, was more than surprised. For that matter when some newly elected Fellows and Young Associates presented some good work in biology and organic chemistry at the Faculty Hall of the Indian Institute of Science, the speakers would have liked to see a few more senior biologists and chemists in the audience.

A senior scientist, who is a Fellow of all the three Academies, told me that India would be much better off if each one (individual and organization alike) did his (its) job well. I thought he was a bit harsh, but on reflection I think that he had a point after all.

Subbiah Arunachalam, Central Electrochemical Research Institute, Karaikudi

Career of women scientists

A panel discussion on 'Identifying Obstacles to Successful Careers for Women Scientists' took place at the 16th International Congress of Biochemistry and Molecular Biology, held in New Delhi, India, Sept. 19–22, 1994. It was sponsored by the American

Society for Biochemistry and Molecular Biology (ASBMB) and the Committee on Equal Opportunities for Women (CEOW). This was the third successive panel discussion in the International Congresses of the Union of Biochemistry, focusing on specific issues

encountered by women. The panelists included Drs Donna J. Arndt-Jovin, Max-Planck Institut, Gottingen, Germany, Angela M. Gronenborn, National Institutes of Health, Bethesda, USA, Manju Sharma, Department of Biotechnology, New Delhi, India,

Shobhona Sharma, Tata Institute of Fundamental Research, Bombay, India, and Marietta Lee, University of Miami School of Medicine, Miami, USA. Dr M. S. Shaila, Institute of Science, Bangalore, India, was the moderator of this discussion.

The main objective of these discussions has been to give women scientists from all over the world an opportunity to consider some of the important issues that women scientists may encounter. By a comparison on the international level, through participation of panelists from different parts of the world, it is hoped that some enlightenment may be achieved for both the male and the female audience. In this year's discussion each panelist spoke for about fifteen minutes, and this was followed by a discussion with the participation of all the audience. It was generally agreed that the representation of women at the top level is indeed very low all over the world, and that social and cultural values were the major basis of this problem.

Dr Donna Arndt-Jovin was the first to speak in the discussion, and she projected the perspective from a German Research Institute. She noted that in Germany the number of women in positions of authority, *viz-a-viz* leaders of research groups, departments or institutes, is pitifully small in comparison to other northern-European countries such as France, Denmark or The Netherlands. This happens despite the fact that the number of women able to initiate a career in science (i.e. the number who finish high school with a college preparatory education) is very large in Germany. She remarked that this number is well above the norm for the rest of Europe if one looks at the statistics for the number of girls graduating from gymnasium, entering university and finishing one or two degrees in the natural sciences. She attributed this drop in numbers to the structure of the educational system which makes combining family and career almost impossible for the university student or non-established (low-income) scientist. The attachment of society to a school structure which depends on parental supervision and help with instruction for grammar school and middle-school children is historically grounded and is changing very slowly, even back-tracking, with the economic recession of the last several years. This is especially true in

the eastern part of Germany. According to Dr Arndt-Jovin, much of the problem lay with the enormous power and authority given to a handful of Full Professors, all of whom at present are males, and therefore do not appreciate or even try to understand the cultural/social problems of women scientists. Based on the present-day situation, Dr Arndt-Jovin voted for the imposition of a quota for women scientists, starting from the middle-level positions, to ensure that there are qualified women available to compete for the higher-level positions in the future. She concluded by saying that it was essential that the few women scientists in Germany who now have upper-level positions in academia and research should make their male colleagues more aware of their problems for advancement and help them to devise concrete ways of changing the present policy.

Dr Angela Gronenborn, who was brought up in Germany but is now settled in NIH, USA, agreed that the statistics for the dropouts amongst women at the higher level in Germany were real, just as real as in any other part of the world. According to her, the low number of women scientists at top levels *now* merely reflects on fewer women opting for science as a career *two decades back*. She stressed that at present there appears to be no difference between the male and the female scientists in USA. To illustrate this, she showed some statistics regarding NIH funding and pointed out that there was no difference in the percentage number of proposals funded for men and women over the past several years. However, Dr Gronenborn did notice a remarkable difference between the two sexes. Women, on an average, asked for much less funds from NIH than men! There was some discussion on this point and it was hoped that women will throw away caution and be just as aggressive in their demands as men in the near future.

Dr Manju Sharma represented more or less the Government of India viewpoint, especially so regarding the upliftment of women in general in this country, including that of rural women. She spoke about the consideration of several facilities to make it more feasible for women scientists to pursue their career. These included possibilities of mid-career breaks being allowed for bearing and raising children for women scientists, and child-care facilities. She

was quite concerned about the fact that the rules for selection and promotion of women scientists were at par with those for men and perhaps should be relaxed as women do have to take care of household responsibilities, including child-bearing. Since women represent half the world's population, their contributions cannot be ignored, she noted.

The author pointed out that there has been no evidence to indicate any difference between the scientific capabilities of men and women, and that the obstacles faced by women towards a successful scientific career are totally social and behavioural. The primary problem lay in the values and attitude of women, which are heavily influenced by society, especially during the formative years. She summarized the obstacles as: (1) social upbringing; (2) career expectations; and (3) social expectations. Elaborating on these, she said that in India the treatment meted out to girls and boys is quite different both at school and at home, often quite unconsciously. Girls were physically confined and protected, rather than allowed to face the world as it is, which results in a general lack of confidence and a lack of aggressive behaviour, both of which are very essential for any successful profession today. She pointed out that in the Indian society the sole career expected for a female child is a suitable marriage. Despite the successful and often excellent performance of female students in school and college examinations, parents of this generation still consider the career preferences of daughters subsidiary to marriage. Therefore, to live in such a society, and yet be a career woman, one has to fight the society all the time. Finally, the author noted that all household responsibilities are solely for the women, whether working or not. This is what causes the large difference between the number of men and women professionals. These include, amongst other regular chores, taking care of children – all their physical needs throughout prenatal, postnatal, infancy and through school and perhaps even college – as also taking care of elders and aged in the family.

Dr Sharma said that at present a working woman is accepted in India mainly because of the extra income. But professional work that may 'neglect' the household is unacceptable, especially so when it comes to taking care of children

and the aged. Most Indian males do little to help in the household work. Many develop a cultivated incompetence for all household work, and society ridicules the males who try to share the household chores. Regarding the promotion and job policies, there are no distinctions between men and women scientists of India. In practice, however, women suffer because their problems are considered to be personal problems, and not those of the society. The handful of women scientists who do excel in such settings are usually those who possess the courage to rebel against the set traditions and conform those around them as well.

She summarized by saying that in India the attitudes are changing towards a professional career. The present-day teenaged girls are much more confident, much surer of their priorities. In many households, at least the concept of working woman and therefore sharing home responsibilities is being accepted. India has the advantage of a comparatively stable family and social life, and women should make the most of it. It is up to the women to question every tradition, to make sure that the next

generation learns to question the same and learns to share all responsibilities equally.

Dr Lee started by saying that she was an oriental settled in USA, and therefore experienced a mixed sense of liberation in her life. On the one hand, she had parents staying with her, which helped her enormously during the early stages of childbearing. But that had its own traditional constraints; for example, she had to devote quite a lot of her own time for the family. She did not quite agree with Dr Gronenborn regarding the achievement of equality of both sexes in science in USA. Dr Lee specifically mentioned that in Medical Schools there was possibly an active discrimination against women, and that women had to perform much better than men for achieving the same status.

The panel discussion was attended by about one hundred and fifty odd people, 90% of whom were women. The general discussion was fairly animated. Amongst potential policy makers, Prof. Balasubramanian, the Director of Centre of Cellular and Molecular Biology (CCMB), India, remarked that every Research Organization should provide

child-care facility, and that CCMB already did provide one. He also expressed the opinion that women scientists' cases should be reviewed with more flexibility for promotion, working hours, etc. Dr S. Brahmachari, Indian Institute of Science, Bangalore, however, commented that the scientific capabilities of men and women were different and that only a few women scientists were motivated enough to achieve outstanding results. Most women in the audience admitted to being suppressed in one form or another, and were of the opinion that it took much more than normal for a woman to succeed in this profession. It was pointed out at the end of the discussion, by a woman in the audience, that despite the large number of women present in the audience, the participation was still dominated by men! Dr Shaila summarized that things are changing for the better, and that women must assert themselves more to excel in the existing set of norms laid out for scientists.

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Mahabaleshwar Seminar on molecular biology of plant viruses*

The 1993-Mahabaleshwar Seminar entitled 'Biology of Plant Viruses' was organized by H. S. Savithri (IISc) and M. M. Johri (TIFR) at Whitefield from November 29 to December 3, 1993. These seminars in selected areas on the frontiers of Modern Biology are organized annually, by the Tata Institute of Fundamental Research and the Indian Institute of Science. Since inception in 1975, the Mahabaleshwar Seminars have been held with minimal formalism and elegant simplicity. The selection of a venue where all participants could

stay together, away from big cities, is equally important and in this respect, the placid environment at Whitefield turned out to be the right choice. At the 1993-Seminar the current status and problems of virus research in our country were discussed.

Highlights of virus research

The seminar began with a lecture by H. S. Savithri on the architecture, genome organization and replication in tymoviruses. Virion in these simple viruses consists of a single molecule of sense mRNA encapsidated in a protein shell made of 180 protein subunits. The stability of the capsid in *Physalis mottle* tymovirus is conferred by inter-subunit interactions and polyamines. In the absence of high resolution X-ray structure, the architecture of the virus can be probed by UV cross-linking and

by use of monoclonal antibodies; these studies show that the weak RNA-protein interactions are mediated via Lys-10. For the expression of their genome, tymoviruses employ common strategies, such as use of proteolytic processing, overlapping reading frames and production of subgenomic RNA. M. R. N. Murthy described the physical principles underlying the construction of viral capsids and the methods used to study it. The structure of *Sesbania mosaic virus* has been determined at 2.9 Å resolution by X-ray diffraction. He also illustrated how the structure determination leads to insights into assembly and to design of inhibitors that block the disassembly process. These lectures were followed by a discussion on various aspects of architecture and assembly of viruses.

H. O. Agrawal (H. P. University, Shimla) reviewed the biology of bipartite viruses which have split

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