

## CORRESPONDENCE

*We received many letters describing individual observations on the recent total solar eclipse. We reproduce below a description sent in by a Class X student.*

— Editors

### Total solar eclipse of 24 October 1995

The total solar eclipse of 24 October 1995 was of great interest and excitement to all the Indians, because it was passing through the Indian soil only for the second time in this century. The totality path swept through the Indo-Gangetic plain in the Northern part of India, which is thickly populated. It gave an opportunity for over 20 million Indians to watch the great event in the sky. Having been selected through a state-level essay competition on Total Solar Eclipse, I was one of the eight members of the team from Karnataka, which was sent to witness the great event.

The duration of the total eclipse was just 53 seconds from where I saw it. I saw the eclipse at Akbarpura, a small town 20 km south of Alwar in the eastern part of Rajasthan. There was great excitement and joyful anticipation all around on the morning of 24 October. Everybody was watching the bright Sun in the east, which would be hidden by the Moon for a short time. We were expected to see through the solar goggles specially prepared for the protection of the eyes from the bright Sun.

The first contact began exactly at 7.24 a.m. I was very eager to see the event of

'totality', that is, when the Moon completely obscures the Sun. As the totality approached, the light around us began to decrease and the temperature also decreased to some extent. The birds started chirping, and began returning to their nests. We could also see the goats and the dogs running here and there. Just before the totality began, we could see the 'diamond ring'. As the Moon almost completely covered the Sun, from eastern and the western limbs of the Moon's surface, a small part of the Sun's light shone through the Moon's valley. This gave rise to an effect of a shining diamond in the sky for a few seconds. It was indeed a great sight to see!

Then the totality began at 8.31 a.m. and it was a wonderful experience for me. A beautiful 'ring' of the coronal light lasted for about 40 to 45 seconds. It was rather dark in the sky and we could see the bright planets of Venus and Mercury, the bright star Sirius and two stars of the Orion constellation. Another change we could notice was that the horizon was reddish-brown all around.

We had spread a white sheet of cloth 5 m long, to see the 'shadow bands'.

The shadow bands passed very quickly in a second or two. We could see the glowing corona somewhat extended in the eastern and western edge of the Sun/Moon. Suddenly, a streak of light pierced through a valley on the Moon's surface. It was just unbelievable! We saw a second 'diamond ring' that was more marvelous than the first. The second diamond ring merged into the end of the totality at 8.32 a.m. The crescent of the Sun started shining and within a minute or so, the brightness reappeared and it was all normal. The eclipse ended at 10.10 a.m.

These were really memorable, exciting and unforgettable seconds for me.

Indians who have missed this unique visual experience, may note that the evening of 11 August 1999 will be yet another rare occasion to see the total solar eclipse from parts of Gujarat, Maharashtra and Madhya Pradesh. So do avail of the opportunity to see the last eclipse in this century.

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### Science in India

One of the great and unique assets of Indian science is the enthusiasm of young people for science and technology. Competition for admission to science and technology-related courses in reputed institutions is fierce. In science and technology, every year thousands of youngsters obtain their Ph D degrees. How many job opportunities are available in the country for these fresh Ph Ds? The answer has to be 'very few' if not an outright 'nil'. Two avenues

open for a vast majority of them now are: (i) migrating to universities, research institutions and industries in developed countries as Post-Doctoral Fellows (PDFs), and (ii) continuing as Research Associates (RAs) in universities and research institutions in India.

Research Associateship, at present, is given for a period of five years with no provision for further extension. In 1960s, 1970s and even in early 1980s job opportunities in the country for fresh Ph Ds were not as bad as it is now. Presently many Ph Ds are unemployed or under-employed. Earlier most of the

Research Associates used to get good (regular) jobs within 2-3 years. In those days restricting Research Associateship for only one term (of 5 years) was fine. But the situation has changed, and after completing one term of 5 years, now many Research Associates are left with absolutely no avenue. The gravity and seriousness of the situation do not appear to have been realized by the science administrators and science managers of the country. Many of them continue to woo youngsters to continue science education, with total disregard for the absence of job opportunities. If

not remedied immediately, the unemployment of Ph Ds is going to have a drastic negative impact on Indian science in the near future.

I would like to suggest two remedies. Firstly, Research Associateship should not be restricted to one term. There should be three or more grades in Research Associateship (say A, B, C, etc.). Those performing very well in the first grade (or the first term of 5 years) should get a second term (of 5 years more) in the next grade; and those performing exceptionally well in the second term should get a third term (of another 5 years) in the next grade. As compared to the number of years spent in education and training, the stipend paid to Research Associates at present is very meagre. There is an urgent need for revising the pay for Research Associates. It should be somewhere near to the salary paid to regular employees having the same qualification and experience.

Research Associates constitute a young, enthusiastic and energetic lot, and contribute much to the scientific output of the institutions in which they work. Still when they complete tenures and go out, they do not get any monetary assistance, whereas even the most unproductive regular employee is entitled for many benefits including pension for self and family. If possible, a contributory provident fund should be introduced for the Research Associates.

This would increase the involvement of Research Associates in their work as well as their interest in the growth of the institution in which they work. It would also help them to pull on for sometime before they get a suitable job elsewhere.

Secondly, funding agencies should make available a few Post-Doctoral Fellowships (PDFs) tenable with professors and senior scientists who are working on projects of national importance and have already made some remarkable contributions (as scientists, not as administrative heads). This way it would be possible to (i) create more job-opportunities for fresh Ph Ds in the country, (ii) establish some strong research teams working on nationally important projects, and (iii) check brain-drain.

It is alleged that research institutions in India hire assistants in place of qualified and competent persons, to work on important projects. How far is this true? Absence of regular recruitments has resulted in a 2-tier system in many of the research institutions. There are permanent employees and temporary employees. When employees involved in the same job are governed by two sets of service conditions, is it not possible that the temporary employees are exploited by the permanent employees? How does this 2-tier system affect the progress of the projects? More impor-

tantly, how does this 2-tier system affect credit-sharing? Does it pave the way for unethical misappropriation of credit? Most of the temporary employees tend to take their job as a stop-gap arrangement, and their involvement in the job becomes very less. To understand all these it is essential to analyse the turnover of assistants in important projects/schemes. Frequent swapping of jobs by assistants affects the progress of long-term projects. Funding agencies should make it compulsory that only Junior Research Fellows, Senior Research Fellows and Research Associates are appointed in projects and schemes which are for a period of three years or more. This would make sure that temporary employees on projects and schemes get a higher pay, and a higher qualification/experience; and they have more involvement in their jobs. It may also prevent possible exploitation of temporary employees by permanent employees.

To succeed in science it is very, very essential that we modify the system according to the changing times. We owe it to the future generations.

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## An alternative view to global vision of Indian R&D

Mashelkar's main thrust is on global R&D, and strong IPR system<sup>1</sup>. His spirited advocacy of the interests of multinational corporations (MNCs) is, however, one-sided. He fails to trace the origin of the big boost corporation-controlled S&T has acquired during the past decade or so, and ignores the fact that the nations professing globalism are engaged in bitter trade wars for supremacy in technology.

Extensive study of literature on S&T policy published in the late 1970s and the early 1980s in US and UK throws light on the genesis of R&D globalism. Declining American leadership in high technology and perceived threat from Japan on US economy and defence capability were the key issues. Political leadership and policy makers in US devised a long-term strategy to face this

challenge. In the year 1980, at least three landmark decisions were made: (1) the US Supreme Court allowed patenting of a genetically engineered bacterium; (2) the US Patent and Trademark Act was amended allowing the universities to apply for patents for federally funded research; and (3) the US Plant Variety Protection Act (1970) was amended. Big companies played a major role in this, while the academic community resented commercialization of research talent and technical skill, pointing out that corporation funding was not for altruistic purposes<sup>2</sup>.

Mashelkar suggests intellectual capital as equity of the Indian R&D partner; a practice in vogue in American universities for more than a decade. The entry of MNCs has pushed the cost of patenting to as high as Rs. 9 lac for a

single patent, and small- and medium-sized-European firms are finding it difficult to file patents<sup>3</sup>. This, coupled with the lack of competent patent professionals in India, would make Indians as cheap intellectual slaves, not equal partners. Whereas IPR systems in other countries have evolved gradually according to their needs, in India the changes are demanded to satisfy the MNCs. How can enforcing new patent laws make Indian R&D innovative? Recalling that the Indian Patent Act (1970) was hailed internationally as the most progressive system, why do our R&D labs not own world-class patents? Why our science leadership failed to update the IPA, and to create world-class patent attorneys in past more than two decades? Now Mashelkar recommends Patent Promotion Fund and spe-