

CORRESPONDENCE

Total solar eclipse – Views of medical professionals

October 24, 1995 was witness to Nature's grandest spectacle – the total solar eclipse. For people 'rooted to their homestead', such an event is rarer than once in a lifetime – once in 350 years or 14 generations (*Curr. Sci.*, 1995, 69, 486–488). Despite the tremendous progress achieved in science and technology, people, even the 'educated' continue to harbour superstitions about several natural events – the most feared being a total solar eclipse. And so on October 24, streets wore a deserted look, shops were closed, people locked themselves indoors and Governments declared holidays. Similar reactions occurred when the 1980 total solar eclipse happened on February 15 – 'nurtured on superstitions, dire warnings from astrologers, eye specialists, pseudoscientists and even the Government of India, (people) locked themselves indoors. . . schools, colleges and government offices closed for the day. . . milk and postal services were suspended. . . public transport came to a halt. . . In vain had responsible scientific writers explained'. . . (*Indian Express*, 22 October 1995). I was shocked that the situation was no different as we approach the 21st century.

To elicit the views of qualified medical professionals about the total solar eclipse, 46 qualified doctors with MBBS and MD/MS degrees, working in King George Hospital and Andhra Medical College, Visakhapatnam, Andhra Pradesh were given an open-ended questionnaire on 24 and 25 of October 1995 after the total solar eclipse.

Visakhapatnam lay in the path of 80% partial solar eclipse (*Hindu*, 19 October 1995). The results of the analysed response to the questionnaire are presented in Table 1.

It is clear from the Table that, 19.6% of the respondents (9/46) missed the

grand spectacle both on TV as well as in the sky. Only 45.6% (21/46) braved the view of the eclipse in the sky. Another interesting feature that came out was that 15 used exposed photographic films and 2 used welder's glasses. However, 4 doctors used X-ray films for viewing – an aid not mentioned in the press or TV for viewing. 34.8% (16) did not venture out of the house till the end of the eclipse even though they were supposed to report for work at 9 AM. (They had all applied for permission to come late by an hour and a half.)

19.6% (9) of the doctors believed in the superstitions related to the eclipse and observed rituals like fasting during the eclipse and having a head-bath soon after. Three doctors said they did not believe in the superstitions but followed the rituals because they were forced to do so at home.

All were aware of the precautions to be taken while observing the eclipse in the sky – a welcome point to note. Responding to a question as to why eclipse is harmful to the eyes, 21 (45.6%) just mentioned 'retinal damage' while the rest tried to explain the causal agent – here again the answers were not unanimous – 6 felt the infra-red rays were to blame and 11 blamed the ultra-violet rays while 8 thought both infra-red and UV rays were the culprits.

Quite surprisingly, 15.2% (7) felt that the skin could be damaged during an eclipse resulting in burns and even cancer. 3/46 (6.5%) thought eclipses had a teratogenic effect on the growing foetus. However, none of them could offer any scientific proof to justify the above beliefs. Surely, this is an unwarranted belief to be harboured by members in the medical community, when it is

Table 1.

Question (n = 46)	Yes	No
1. Did you witness the eclipse – in the sky	37 21	9
2. Did you step out of home (to work) during the eclipse	30	16
3. Do you believe in the superstitions about eclipse	9	37
4. Did you observe the rituals (fasting, head-bath)	12	34
5. Do you know the precautions to observe while viewing eclipse	46	0
6. Are there any ill-effects (other than visual) of eclipse – skin burns/cancer – teratogenic	8 7 3	38
7. Was the government right in declaring a holiday?	24	22
8. When is the next total solar eclipse in India?	26 (correct response)	20 (do not know)

known that the eclipse has no effect on the skin.

52.2% (24) viewed that the AP government was right in declaring a holiday on October 24. 56.5% (26) answered correctly that the next eclipse in India would occur in August 1999.

The above results should be an eye-opener for scientists and rational thinkers. Doctors are considered as intellec-

tuals, professionals and are often regarded by patients as their teachers and guides. Their beliefs and principles have a strong impact on the patients under their care; further any lay person would be expected to go to a doctor for clarifications of doubts and for proper instructions for viewing an eclipse. Thus, society cannot afford 'learned men' propagating wrong notions. It is

high time that rational scientific people, bodies and journals like *Current Science* and *Resonance* spread the right message across.

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NEWS

A triple helix of academic–industry–government relations: Development models beyond 'capitalism versus socialism'

Despite different development histories, a broad spectrum of societies, formerly conceptualized under the divergent rubrics of the first, second, and third worlds, have formulated innovation strategies based upon the deliberate elaboration of academic–industry relations through reflexive S&T policies. Newly industrializing, de-industrializing and re-industrializing nations, somewhat to their surprise, find that they share a mutual interest in fostering knowledge-based economic and social developments requiring the creation of boundary spanning mechanisms.

How should one model the knowledge infrastructure of such a global system? We proposed to study this complex system as a triple helix of university–industry–government relations¹. A workshop in Amsterdam (3–6 January 1996) discussed the triple helix in various national and regional contexts. Ninety participants came from several world regions including Latin America, eastern Europe, western Europe, north America, Australia, and southeast Asia.

Traditional bi-lateral dynamics

The Dutch Academy of Science and Engineering adjacent to an Amsterdam canal, formerly the home of the State Museum and Rembrandt's famous 'Nightwatch' painting, was the site of the opening session of the triple helix meeting. More than 200 Dutch R&D experts and foreign visitors heard Kees

Builthuis, the director of Philips R&D, discuss the relationship of the university to an R&D intensive multinational corporation. Not surprisingly, Philips looks for personnel, discipline-based research and possibly interdisciplinary research from academia but primarily relies on its own tightly-managed interdisciplinary teams for innovation inputs into its mass-consumption electronics products. Nevertheless, even though its interests are practical, Philips maintains a focused basic research effort on silicon, a topic highly relevant to its technologies.

Frigas Gelegyi, director of the Zoltan Bey Foundation in Hungary, discussed the Hungarian transition. The Zoltan Bey is the successor organization to the branch industrial research institutes under the former socialist system; now the remaining institutes are jointly sponsored by government and industry following the German Fraunhofer model. Formerly, Gelegyi was pessimistic about a role for domestic R&D, given the influx of foreign companies bringing their own technology. Although these initial fears were partially realized; having entered the Hungarian scene, foreign companies soon acquired Hungarian suppliers and these local companies, having to update their technologies to meet higher standards, needed the support of the Hungarian innovation system. Now that the technical requirements for products have been raised; real rather than formal connections to R&D sources are needed, thus Gelegyi's qualified optimism.

The triple helix model

These two instances of academic–industry and government–industry ties exemplify older familiar bi-lateral formats of technology and knowledge transfer. The thesis of a trilateral or 'triple helix' model of innovation is that three institutional sectors (public, private and academic) that formerly operated at arms length are increasingly working together, with a spiral pattern of linkages emerging at various stages of the innovation process. Start up firms are a common outgrowth of the three sectors: arising from academic research groups, national laboratories, and the laboratories of large corporations.

There are four dimensions to the development of the triple helix model: the first is internal transformation in each of the helices, such as the development of lateral ties among companies through strategic alliances or an assumption of an economic development mission by universities. The second is the influence of one helix upon another, for example, the role of the US federal government in instituting an indirect industrial policy in the Bayh–Dole Act of 1980. When the rules of the game for the disposition of intellectual property produced from government-sponsored research were changed, technology transfer activities spread to a much broader range of universities, resulting in the emergence of an academic technology transfer profession and information media to service it.

The third dimension is the creation of a new overlay of tri-lateral networks and