Ph D theses from Indian universities

Dipak Mandal's comments on science education (*Curr. Sci.*, 2001, **81**, 436–437) prompted me to share my concern on Ph D theses from India. I have had plenty of opportunities to adjudicate theses submitted by students from as many as twelve different Indian universities for the degree of Doctor of Philosophy (Ph D). To my surprise and dismay, I find that many of them contain information that can at most be awarded an M Phil (Master of Philosophy) degree. Exceptions for this observation certainly exist, but in my field these appear to be small in number.

Firstly, a Ph D thesis is supposed to represent the fruition of an *advanced* and *intensive* study undertaken by a student over a period of 3–5 years. Secondly, it is supposed to contain the results of an *original* piece of work. In the Indian theses I have adjudicated so far, both of these conditions seem to be highly diluted. In addition to this, confusion prevails among the Indian academia (supervisors) and academic managers (members of university senates and syndicates) in differentiating an American Ph D thesis that will normally include intense course work and a relatively brief, designated research report (= thesis) and a British Ph D thesis, which will generally include only an extensive research report (= thesis) without any major course work requirement. Ph D theses, from India, although styled essentially after the British model, report findings concerning 'relatively minor' to 'micro' problems following the American research report model, but do not explain to the adjudicator whether any course work was done additionally by the student to qualify for the degree. The unfortunate element here is that the Indian theses are inflated beyond reasonable limits by using a wordy language and by including unnecessary details and illustrations (e.g. photographs of the instruments used)!

To overcome this undesirable trend, the universities must consider advising the prospective candidates that they should publish 5–6 research papers in refereed international journals, during the period of their Ph D study. However, it will be critical for the academic bodies of the universities to develop an internationally acceptable definition for *refereed journals*. At the end of the prescribed period (3–5 years), the candidates must be encouraged to submit the thesis which will include the published papers supported by a brief, common introduction and conclusion. The common introduction and conclusion will link to the major question the student investigated and thus make the thesis comprehensive. Even if the last two papers remain unpublished at the time of formal submission of the thesis, they could be included in the body of the thesis, as long as the editors of the refereed journals have formally accepted them.

Such an approach will resolve many problems faced by overseas examiners who are invariably confused if the thesis is an outcome of extensive research alone, following the British model or the degree requirement includes both course work and a brief thesis, following the American model.

For the candidates, this approach will

- assure a positive result, because the thesis will include published material of original research; therefore, the adjudicator will have less difficulty in recommending it for the award of the degree
- eliminate verbosity
- build immense self-esteem and professionalism
- ensure better writing and presentation skills.

ANANTANARAYANAN RAMAN

The University of Sydney,
PO Box 883,
Orange, NSW 2800, Australia
e-mail: araman@orange.usyd.edu.au

European sightings of the Crab supernova

Narlikar and Bhate (*Curr. Sci.*, 2001, **81**, 701–705) have tried to find out possible references to the sightings of supernovae in Indian texts. While no definite records have been found, their effort is certainly laudable as part of history of science. They have also given a history of the sightings of the Crab supernova. This note is to draw attention to some recent research on the European sightings of the Crab supernova.

The track record of Europe in recording supernovae is rather mixed. Europeans did record the sighting of the 1006 supernova in Lupus. Scientific beliefs of the Greek civilization did play a major role in Europe in recording astronomical events. According to Aristotle, the heaven as it appears to us, is perfect and complete. Comets, meteors, etc. were thought of as phenomena connected with terrestrial atmosphere. Thus there was no room in Greek thought for any new astronomical phenomenon and this seems to have become more of a dogma after the 12th century. It did take some courage on the part of Tycho Brahe in 1572, to publicize ('On a new star, not previously seen within the memory of any age, since the beginning of the world') the supernova in Cassiopeia which eventually came to be associated with his name. However, the belief in the 'complete' heavens was so strong in the Catholic circles that in 1604, when Kepler's supernova appeared, Galileo (who said 'Why new stars? I know nothing about old stars also!') vacillated a long time, before declaring it to be just another phenomenon associated with terrestrial atmosphere. (It should be noted that this was 6 years before Galileo turned his telescope towards the sky which tore him away from Aristotle in astronomy also.) According to some science historians, the appearance of these two supernovae within a relatively short time and which could be seen by all the populace was more effective than the efforts of scientists in bringing down the Greek ideas of the Cosmos.

It should be noted that 1054 was quite a catastrophic year for the Roman church. Pope Leo X who was to be canonized later, passed away in April of that year and the church in Constantinople broke away completely from the mother church. It is possible that the appearance of the supernova at this juncture was considered not a good omen and thus efforts might have been made to ignore it. However, some European scholars have persevered to make the story of 'Birth of Crab' complete. In 'The supernova of 1054 in two contemporary European chronicles' by Guidobani *et al.*[1,2], the authors (who belong to research institutes of Bologna and Frascati) try to make the point that the event was indeed witnessed and recorded in Europe. 'Contrary to the common assumption, we believe that the explosion of 1054 was noted in European medieval chronicles .... Definite mention ... in a Flemish chronicle and a more uncertain Roman chronicle of that time'. The Flemish chronicle (by a monk) relates the death of Pope Leo X (on 19 April 1054) to a very bright object seen even in the daytime. The Roman chronicle, while mentioning the Pope's death, records some miraculous light on the same day. The actual description of the event in both accounts is not any better than in the Indian verses mentioned by Narlikar and Bhate. However, the common factor between the two European sightings is the time of the event, which emboldens the authors to make the following statement: 'The European chronicles show unequivocably that a bright object appeared in broad daylight in both Rome and Oudenberg (Belgium) at least in a day in April of 1054'.

However, what makes the paper more interesting and thus controversial are the extrapolations of the authors. Ibn Butan, mentioned by Narlikar and Bhate also, ascribes the event of H446 which incidentally begins on 12 April 1054. Using this information as well as the possible European sightings, the Italian authors argue that the explosion did indeed take place in April of 1054, when the Crab would be in a perfectly visible position with respect to the sun. It would have been less visible from the beginning of May, since it moves towards the sun for a conjunction on 29 May. It would again start being visible just at the beginning of July and it was at this time it was picked up by the Chinese astronomers. The Italian scientists also suggest that the supernova, which has been classified as 'Type II – linear' should really be classified as 'Type II – plateau', since it remained bright from April onwards.

It is said that a culture which thinks of time as basically cyclic, will not be able to produce reasonable history. Primary example of such a culture is the Indian culture, where the same word in some Indian languages refers to both yesterday and tomorrow. The major difference between the western (European and Arab) accounts and the possible Indian accounts is in ascribing time to the event and thus make it a part of history.

1. Guidoboni, E. *et al.*, Proceedings of 23rd International Cosmic Ray Conference, Univ. of Calgary, Canada, 1993, pp. 1, 41.
2. Guidoboni, E. *et al.*, *Le Scienze* (in Italian),1992, **49**, 292.

P. R. VISHWANATH

Tata Institute of Fundamental Research, Homi Bhabha Road, Colaba, Mumbai 400 005, India
e-mail: vishwa@tifr.res.in

Need of bryophyte bank for environmental monitoring in India

India has a long Himalayan belt. The Himalayan mountains lie between the Indus river and the Brahmaputra river, for a distance of about 2500 km. It consists of three parallel ranges – the Himadri (Greater Himalaya), the Himanchal (Lesser Himalaya) and Shivaliks, from north to south. Important hill stations such as Shimla, Manali, Kulu, Mussouri, Darjeeling, Nainital, Ranikhet, Almora and Mukteswar are located on the Lesser Himalaya range. Below it, are the Shivaliks having an altitude range below 1250 msl. These hills exhibit a great diversity in geology, physiography, climate and ecology.

As technology advanced, pollution has evolved from a local environmental problem into a global one. During the industrial revolution of 1980s, sulphur, Co_x, NO_x, metal ions were the major atmospheric pollutants. Manufacturing of plastics, pesticides, disinfectants, etc has added many other metal ions into the air other than those due to automobiles. Most of the pollution-monitoring experiments are conducted through the analysis of soil collected from different stations. This is a costly and time-consuming exercise. Besides this, the different hilly slopes receive different amounts and types of atmospheric precipitations. Increase in the number of automobiles, unplanned construction and population pressure have resulted in environmental deterioration. It is very difficult to monitor the atmospheric precipitation all over the Himalayan belt, as it requires deployment of instruments, manpower and electricity. A hindrance in any of above requirements may diminish the importance and significance of the data. Alternatively, atmospheric precipitation may also be monitored through some biological agents, specially by bryophytes, growing luxuriantly on the Himalaya. The technique is simple, reliable and quick. Overall, the entire Himalayan range has well-diversified and rich bryoflora. Bryophyte species do not possess a cuticle and therefore can take up water over their entire surface. As a result, they obtain their nourishment directly from atmospheric deposition. High metal-accumulation capabilities of bryophytes have opened the possibility of their use as biomonitoring agents of environmental quality, specially in remote