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.

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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 areas, through naturally-growing bryophytes or through bag transplant techniques using hyper-accumulator bryophytes. Due to lack of transportation mechanism, minerals absorbed by bryophytes are preserved nicely within the cell, without any loss during storage. This potential has been used to study the trend of change in atmospheric quality by analysing the present bryophyte specimens and comparing them with analytical data of the past bryophyte specimens preserved in the herbarium.

Since plants have been used as source of information about pollution, they have been tested. Specific plants could absorb high concentrations of heavy metal into the tissue and retain them. In spite of having a small size, bryophytes obviously contribute significantly in mineral budget and ecological balance. Bryophytes form an important and striking part of the cool and humid Himalayan scenario. They grow in almost all kinds of habitats like rocks, boulders, stones, hillsides, tree trunk, forest cover and various artificial substrates[1]. Many species have a wide geographical distribution and grow in a wide range of habitats, which is beneficial for comparative studies. The following qualities make them an ideal choice for biomonitoring studies[2].

1. Bryophytes can accumulate high levels of precipitation directly from the atmosphere.
2. Samples can be collected/harvested even from the remote areas where instruments cannot be deployed.
3. Bryophytes have a rapid absorption rate.
4. Slow or partial desorption of metals enables us to detect and evaluate pollutants even after years of the study.
5. After analysis of past samples, one could easily correlate the percentage change in air quality.
6. Collected bryophytes can be stored as such without any decay, as no pathogen seems to attack them. Further they are not chewed by insects as well.
7. They can be analysed even after very long interruptions, even up to 200 years.
8. The dehydrated specimens can be easily sent by mail for inter-laboratory examination within the country or abroad.
9. They need minimum or no maintenance.
10. By comparing the analytical data of fresh specimens with herbarium specimens, one can also perform retrospective studies.
11. To evaluate and compare the rate of annual atmospheric precipitations, development of a Bryophyte Environment Bank is desired and essential.

The naturally-growing mosses can critically be evaluated and analysed to monitor the deposition of atmospheric quality. Bryophytes as environmental indicators for long range and local atmospheric, transported heavy metals, have been successfully developed on the basis of moss analysis. By analysing the native moss *Pleurozium schreberi* in the Netherlands, the concentration and trend of industrial pollution was studied in city and moss analysis in 1992 revealed that the concentration decreased between 1987 and 1992 (ref. 3). High lead deposition pattern in moss reflects an increase in pollution with increased industrialization, specially in the post-World War II scenario.

Mosses have been used successfully in Germany to monitor the temporal and spatial trends of metal contents from the atmosphere[4]. Native and transplanted mosses were used as a complementary technique for biomonitoring the metallic precipitation in industrial areas by Fernandez *et al.*[5]. Vile *et al.*[6] observed changes in the air quality in the Czeck Republic, by comparing the present specimen with that of 200-year-old specimen obtained from World Environment Bank of Sweden.

For collection of past environmental data, there is an urgent need to establish a Bryophyte Environment Bank at a national level in India. In the global scenario such banks have already taken shape in Italy and Sweden[6,7]. The herbarium specimens collected from marked localities across the country can be stored in these banks and could be used to detect the precipitation of the past. Also comparing the analytical data of the fresh specimen, one can detect the trend of atmospheric precipitations.

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