

The human face of MNCs

In their article 'A clean certificate for transgenic plants' (*Curr. Sci.*, 2000, **78**, 768–769) Deepu Mathew and B. N. Sathyanarayana suggest that because of the antecedents of the original author (K. K. Narayanan), the views expressed by him had to be biased.

Regarding cross-pollination between transgenic and conventional maize, I wish to point out that biosafety regulations of USA, Canada, EU, etc. demand safeguards against cross-pollination between transgenic crops and their weedy relatives, if any. Natural out-crossing between a transgenic crop variety and its conventional counterpart is not considered a bio-hazard. In fact, planting of refugia (conventional varieties) in the neighbourhood of *Bt* (transgenic) maize fields is encouraged to prevent/delay the deve-

lopment of resistance in corn borers. The authors also refer to an opinion of M. S. Swaminathan without citing the source.

It is also not clear why just a sentence is quoted verbatim out of Klaus Leisinger's paper (*Curr. Sci.*, 1999, **76**, 488–500) without stating its context. No grounds have been established for making the prophecy '... MNCs will control the food market leading to a (*sic*) complete disappearance of indigenous cultivars and seed companies'.

Finally, I would like to refer to the recent public announcements made by two different MNCs, viz. (i) Novartis to provide technology (e.g. patented genes, etc.) at no cost to subsistence farmers (i.e. a farmer having the majority of his/her agricultural production consumed by his/her immediate family unit); and

(ii) Zeneca, as a part of their collaboration with the inventors Ingo Potrykus and Peter Beyer and 'Greenovation', to enable the delivery of 'golden rice' technology free-of-charge for humanitarian purposes in the developing world. Do not such proactive steps also show the human face of MNCs?

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Current Science: A vibrant and lively journal

This is just to say how grateful I am to *Current Science* for strengthening the scientific temper in me not as an alternative system to my own humanistic discipline or creative world. The perceptions of a creative writer or a thinker are necessarily nourished by a philosophical and spiritual outlook. How close is science in its pursuit of the same objective, namely Truth, becomes more and more evident when we go through the various issues of *Current Science*. The recent issue that carried the book reviews of *Einstein and Religion* by Max Jammer or *Medicine's 10 Greatest Discoveries* by M. Friedman and G. W. Friedland for

instance has been the immediate provocation for me to write this letter. The various research articles, research news, correspondence, book reviews, research communications, etc. make *Current Science* a very vibrant and lively journal of excellence both in form and content. The range is mind-boggling; cosmology to catalysts for plastics to large Palaeolakes in Kaveri basin in Mysore Plateau to the dilemma of influenza to the fun of holding Indian Science Congress melas and so on (all cited from one recent issue).

Personally speaking, it has been an enlightening and delightful experience (attributes that we normally associate

with either music or literature) for me reading *Current Science* during the past six months. My only regret is that, it is not widely known in the academic circles though it was founded in 1932. That it springs from our neighbourhood in Bangalore, is a matter of great pride.

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On those heavenly pathogens. . .

Fred Hoyle and Chandra Wickramasinghe's opinion on the dilemma of influenza (*Curr. Sci.*, 2000, **78**, 1057–1059) is very interesting but intriguing. The appa-

rent correlation between sunspot activity and major worldwide pandemics is convincing. The prediction of 2000 June pandemic is a bit scaring, too. However, I

feel more scared about the way the authors approach the problem. The explanations given have little logical consistency and the scientific basis is too

flimsy. The description of 'comet-transported, sunspot-assisted' outbreak of diseases appears more a fiction than a scientific theory. The concept of extra-terrestrial pathogens and the postulate of mysterious 'twister' mechanism of transmission place their views somewhere in the realm of superstition.

Readers can easily feel the inconsistency in introducing extra terrestrial pathogens since it no way solves the dilemma! (The idea itself is redundant because we have abundant terrestrial pathogens of all possible categories present in the atmosphere.) The crux of the problem is not the origin of pathogens but the spread of infection. The correlation represented in figure 2 of the article can be explained in many other ways. For example, it is already known that sunspot activity can influence terrestrial parameters, with effects ranging from meteorological to physiological. I think, contemporary microbiologists can solve the mystery (if at all they find it worthy of doing so) by incorporating known terrestrial mechanisms, without popping their eyes at mysterious cosmic phenomena.

Some of the statements given are unacceptable from a scientific point of view, because unvalidated ideas are presented as facts. The best example is, '... An idea such as this (i.e. vertical transmission of virulent patches) may have been seen as widely outrageous in 1978, but now it is less so with the modern trend to accept that life could be distributed on a vast cosmic scale and moreover that terrestrial life may have been brought to earth by comets'. This is an exaggeration which may mislead a naive reader.

The idea of cometary pathogens and their travel across the space (modern version of *panspermia*) put forward in 1978 by the authors was just a postulate based on the correlation of cometary events and the outbreak of diseases. As scientific knowledge base in related areas was limited at that point of time, the idea was taken as an explorable possibility. However, extensive investigations conducted in subsequent decades shed more light on various aspects of the problem¹. The new knowledge, as it accumulated, made *panspermia* more and more irrelevant. According to scientific conventions², it is difficult to consider the postulate as a successful theory because it has not been validated through any means.

The last decade witnessed ambitious search for extra-terrestrial life, confirmation of extra-solar planets and the emergence of Astrobiology³. Readers can find innumerable related articles in science periodicals like *Nature*, *Science* and *Scientific American* in recent years. Except for some lone and wild speculations^{3,4}, *no trend could be seen* to accept that life is distributed on a vast cosmic scale. The best optimistic assumption we can make, based on the current theoretical and experimental data, is that amino acids like adenine might have formed in the interstellar clouds. There is a long way to go before amino acids organize as RNA or DNA, and the formation of a living cell is a far more complicated process¹. The conditions for these can occur only in a planetary body associated to a star.

It is very surprising that Hoyle and Wickramasinghe quote their own conjecture of comets bringing life (and life-devouring pathogens too!) to earth as an accepted scientific theory. This idea is promoted only by them and supported only by their collaborators. Until three centuries ago, comets have been mysterious astronomical objects, appearing in the sky in an unpredicted way outwitting astronomers and panicking common man. Now it is no more so. It has been proved that comets are members of the solar system, probably with the simplest structure. Explorations done in the past few decades provided us with a sufficiently clear idea about the origin, composition, and physical parameters of most of the objects in the solar system, including comets. We have also indisputable understanding about the conditions for life to evolve, sustain and proliferate¹. Attempts to relate comets and life in Y2K are nothing other than the relic of the *cometophobia* of cave-men.

If anybody searches for life in the solar system, comets will be the last place to be examined. The crust of comets, according to existing data, possesses none of the essential conditions (chemical composition, liquid water and energy) for life to evolve. If self-replicating biomolecules can form on such an object, the polar ice caps of the moon would be a better host for life. Hoyle and Wickramasinghe go far ahead to conceive cellular organisms on comets. If cellular life forms could thrive on those frozen masses at 100 K 'warmth' and form *E. coli* bacteria or influenza virus, we would have hatched

many of that kind in the refrigerators at our homes!

We cannot neglect the chance of liquid water present in an icy space object through thermal processes at the interior, as proposed in the case of Europa⁵. That possibility is remote in the case of comets because of their low mass. If anybody can conceive life (even at the level of nucleic acid) to form in the dark crevices at the core of comets, we would have shook hands with the little green men from Mars!

The validity of Hoyle and Wickramasinghe's ideas can be very well tackled scientifically through indirect but logically consistent analyses. If their version of *panspermia* is valid, innumerable comets wandering at the brim and outside of the solar system are spraying bacteria and virus around. Some of them change their paths to swirl across the planetary system. There is no reason to think that comets will spare other planets while spreading micro-organisms to earth. Considering the cometary events that have occurred in the previous millennia, a detectable smear of cellular stuff should have formed on the surface of Mars and other planets. Direct investigations on the surface of Mars failed (twice! The Viking Mission and The Pathfinder Mission) to give evidence even for the possibility of presence of amino acids.

It is to be noted that *Hoyle-Wickramasinghe panspermia* permits cometary pathogens to travel safely through interplanetary space to earth overcoming the fatally sterilizing solar wind and cosmic radiation prevailing in their path. If such a mechanism is valid, it should work the other way round also. We have incomparable abundance of microbes on earth than what is likely to be formed in all comets together. Spreading of terrestrial pathogens in the solar system (*reverse panspermia*?) is a more logical hypothesis. Mars investigation ruled out this possibility also, invalidating the concept of interplanetary travel of pathogens.

To sum up, our current knowledge does not permit acceptance of the idea put forward by Fred Hoyle and Chandra Wickramasinghe.

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1. Various authors, *Sci. Am.*, 1994, 271.
 2. Popper, R. Karl, *The Logic of Scientific Discovery*, Hutchinson, 1980.
 3. Report, *New Sci.*, 2000, 165, 4.

4. News Report, *Science*, 2000, **288**, 603.
 5. Pappalardo, R. T., Head, J. W. and Greely, R., *Sci. Am.*, 1999, **281**, 54.
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Response:

Manoj Komath's comments contain factual errors that invalidate the conclusions he seeks to draw. The idea that 'cometary pathogens and their travel across space (modern version of *panspermia*) . . . was just a postulate based on the correlation of cometary events and the outbreak of diseases' is false. Our formulation of panspermia began in 1974 with attempts to understand absorption, emission and scattering properties of interstellar grains¹. The starting point was the simple fact that organic models of dust matched the astronomical data far better than inorganic models. By 1979 astronomical observations began to show that over 25% of C in interstellar space was tied up in the form of hollow organic particles which, from a spectroscopic point of view, could not be distinguished from freeze-dried

bacterial particles. The challenge then was to explain how interstellar carbon could be converted so exceedingly efficiently into bacteria-like grains, and it is to this end that we looked to comets as a replication site for anaerobic microbes. Subsequent observations of comets from 1986 onwards yielded data that were fully consistent with a microbial model of cometary dust. The statement that ' . . . if cellular life forms could thrive on those (cometary) frozen masses at 100 K "warmth" . . . we would have hatched many of that kind in the refrigerators at our houses', is as ludicrous as it is misleading. The author reveals a combination of prejudice and a woeful ignorance of the relevant literature in this area. Comets, when they formed, would have possessed liquid cores due to radioactive heat sources, and the warm liquid condition would have been maintained for a good fraction of a million years. It is during this time that even a single microbe from a previous generation of replication would multiply exponentially to overwhelm the interior region of a fledgling comet. After the radioactive heat sources became exhausted, cometary microbes would go into a frozen dormant condition to be released only when the comet is perturbed into an orbit that takes it close to the sun.

Komath's statement about the lack of contemporary microbial life on Mars is arguable as his comment that no microbial life exists on other solar system

planets and satellites. Absence of available evidence is surely not evidence of absence. These are all matters for future space explorations to resolve. The facts in favour of panspermia may be summarized as follows: (1) It is based on well-attested survival properties of extremophilic microbes; (2) The well-known replication properties of micro-organisms; (3) The detection of isotopic signatures of life on the early earth before 3.83 Gy, under conditions of intense cometary bombardment; (4) The consistency with astronomical data of a bacterial model of interstellar and cometary dust.

The author's cavalier and arrogant dismissal of a hypothesis that he dislikes does not reflect well on his presumed role of a scientific critic.

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1. Hoyle, F. and Wickramasinghe, N. C., *Astronomical Origins of Life: Steps Towards Panspermia*, Kluwer Academic Press, and references therein, 2000.
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NEWS

The Inter-Academy Panel and the Inter-Academy Council

Many in the scientific community may not be aware about the existence of the Inter-Academy Panel (IAP) or the newly created Inter-Academy Council (IAC), but these have already acquired an enviable status amongst the science academies globally. Since India played a significant role in their creation and functioning and is expected to make important contributions, it is time to provide a brief account of these scientific enterprises through this prestigious journal. These have already figured briefly in *Science* and *Nature*.

In May 1992, at the invitation of the Royal Society of London and the US National Academy of Sciences, Presidents of ten academies of science representing different regions of the world, met in London, to discuss the desirability of organizing a meeting of the science academies to develop a consensus statement on Population and Development, the subject of an UN conference to be held at Cairo in 1994.

At this meeting it was decided to hold a conference on the subject to which

representatives from all national and regional science academies would be invited. The invitation of the Indian National Science Academy (INSA) to hold this meeting at New Delhi was unanimously approved. Thus a 'Population Summit' was held at Delhi during 24 to 27 October 1993. This was a unique event where more than fifty academies of science participated, probably for the first time ever, to discuss an issue of global concern. Following the deliberations, a consensus statement, subscribed to by the