

## CORRESPONDENCE

lations and assist with the training of personnel to administer them.

– It is frequently argued that farmers growing GM crops lose their freedom when they are obliged to buy their seeds annually. However, in most developing countries farmers are accustomed to using farmer-saved seeds that is in many cases allowed by law, and this could also be applied to GM cultivars.

The Berlin Statement denounces the unsupported arguments used against GM crops and calls upon governments and environmental NGOs to end unjustified campaigns against GM crops.

Such a firm and positive stance covering all contingent issues is most welcome, more particularly since it comes from Europe, often cited as 'vehemently anti-GM'. The scientific community of de-

veloping countries should provide all the support to this effort of the Berlin Group.

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## Comments on measurement of organizational scientific productivity

Mehta<sup>1</sup> has provided the verbal description of Lotka's law. Lotka also provided a 'general formula for the relation... between the frequency  $v$  of persons making  $x$  contributions' as ' $x^nv = \text{const}$ '. Lotka found the value of  $n$  as 2 (ref. 3). Suppose, in a sample it is found that 1,000 authors have contributed one paper each. According to Lotka's law, the number of authors contributing different number of papers will be as in Table 1.

The equation provided by Lotka is an exponential one, hence, it generates an exponential curve. With the values of P and A given in Table 1, the curve takes the shape as in Figure 1. In Mehta's paper figure 1 shows 12 graphs which are all straight lines<sup>4</sup>! They do not represent typical Lotka curve and may mislead readers.

The curve generated by the author's data for the year 1994 (Table 2) is presented in Figure 2 which is not a straight line but an exponential curve.

Aggregated papers (1994–2003) (ref. 5; table 1) show that as many as 1394 scientists of the Laboratory have contributed only one paper each in a period of 10 years on whole count. In fractional count, the number drops down to 691. This is unbelievable. Normally, while cumulating, the names of the authors are

arranged in one alphabetical sequence, and the number of contributions made by each author is posted against each name. The figures against each author is then summed up for the period of cumulation. In this case, it is ten years. In a ten-year cumulation it is usually seen that even the most unproductive author has to his credit two or three publications. This phenomenon brings down sharply the number of authors contributing single papers. However, contrary to expectations, the number has gone up in Mehta's paper!

Mehta also tried to apply Zipf's law by taking the number of papers against the rank of the authors<sup>6</sup>. In fact, Zipf's law is applied to study the *frequency of words occurring in a published item*. Zipf wrote in his paper: 'Observing the speech of many hundreds of millions of people, we have demonstrated, in part actually, in part by induction, that the conspicuousness or intensity of any element of language is inversely proportionate to its frequency. Using  $X$  for frequency, and  $Y$  for conspicuousness (rank) we can express our thesis thus:  $Y = n/X$  or  $XY = n$ , where  $n$  is some constant'<sup>7</sup>. The verification of the Law came through the use of Miles L Hanley's *Index of Words for James Joyce's Ulysses*. Zipf found that the rank frequency word distribution 'approximate

the simple equation of an equilateral hyperbola:  $r \times f = C$ ' (ref. 8), where  $r$  indicates rank and  $f$  frequency. The two graphs presented by the author (figure 5 a and b) are far from hyperbolas.

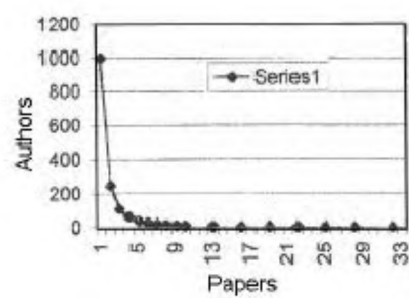


Figure 1. Lotka curve.

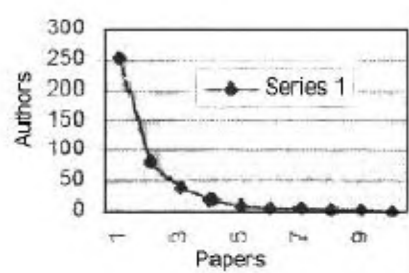


Figure 2. Curve based on author's data.

Table 1. Number of papers contributed by authors

P	1	2	3	4	5	6	7	8	9	10	13	16	19	25	28	32
A	1000	250	111	63	40	28	20	16	12	10	6	4	3	2	1	1

P, papers; A, authors.

Table 2. 1994 data of Mehta's paper

No. of papers	1	2	3	4	5	6	7	8	9	10
No. of authors (observed value)	253	82	38	20	10	7	6	3	2	1

Such studies are no doubt good academic exercises. However, people in general will be more interested to know the contribution of NCL, one of the topmost chemical laboratories of the country in more concrete terms such as its major contribution to chemical science as well as in national development. If scientometric studies are directed to project the achievements of the laboratories, it will be more worthwhile.

1. Mehta, N., *Curr. Sci.*, 2005, **88**, 223–230.
2. Lotka, A. J., *J. Washington Acad. Sci.*, 1926, 317–323 [quoted in Hertzfel, D. H., *Encycl. Lib. Inf. Sci.*, 1987, **42**, 159.]
3. *ibid.*
4. Mehta, N., *op. cit.*, p. 225.
5. *ibid.*, p. 228.
6. *ibid.*, p. 226.
7. Zipf, G. K., *Harvard Studies in Classical Philology*, 1929, **40**, 89 [quoted in Hertzfel, D. H., *Encycl. Lib. Inf. Sci.*, 1987, **42**, 181.]

8. Zipf, G. K., *Human Behaviour and the Principle of Least Effort: An Introduction to Human Ecology*, Addison-Wesley, Reading, Mass., 1949, p. 24.

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## Indian geoheritage, geodiversity: Geosites and geoparks

In a vast country of sub-continental dimensions like India whose rocks provide a unique spectrum of geoheritage and geodiversity from the oldest (nearly 4000 million years old) to the youngest rocks, establishing geoparks for showcasing geological attractions for public education, recreation and sustainable economic development, can be a comprehensive panacea. We are nowhere on the world map as an enlightened nation caring for sharing its vast knowledge resources.

Not far from city beautiful, a few km from Kala Amb, the GSI established Saketi Fossil Park on its 125th Anniversary. HP Tourism failed to maintain it or effectively utilize it for promoting geotourism. In contrast, nature has conserved better the fossil wood near Kumharhatti or volcanic ash behind Hotel North Park near Nadha Bridge. Almost all over the country, Geological Monuments and Parks built by GSI are in utter neglect and in total disuse. Our neighbour China seems to have been more innovative and aggressive on this crucial front and the Office of World Geoparks Network is situated in Beijing (worldgeopark@mail.mlr.gov.cn). No one is allowed to plunder the Chinese natural wealth and the sites are well laid out as well as catalogued on internet and supported by curatorial staff.

The Swiss have a history of quickly converting their limestone quarry in Juras into a National Park, the moment dinosaur footprints were noticed in wonderful preservation. Recently a road construction near the French Border in Canton Jura was diverted and dinosaur discovery converted into a roadside natural history museum. Our dinosaur fossil eggs in the limestone near Jabalpur were consumed by the cement plant and now are plundered by one and all buying these at huge price from locals.

Often such societal and conservation efforts are not undertaken presuming

these to be bookish. It is actually very easy to make people realize the close links between their lives and rocks, fossils and resources around them. The concept of geoparks and geosites must not be dismissed as mere cliché coined by scientists in search of survival or funds.

What to talk of establishing modern geosites and geoparks, even our existing museums are grossly underutilized! A small country like the Czech Republic uses its complex caves system in the Moravian Karsts for earning millions out of tourism besides having souvenir shops using rocks, minerals and fossils. Our caves are either plundered or occupied at great cost to posterity. The time has come to put India and its tourist sites on the world map by linking these effectively to scientific knowledge and attracting tourists as well as scientists to the earth history entombed in the rocks used for making those monuments of historical value to mankind. We need scores of geological publications on all our tracks and trails in a language intelligible to an average tourist, especially now, when we are a part of UNO's celebrations of triennium from 2007 to 2009 of International Year of Planet Earth 2008. If we miss this greatest geoshow of the world, like we did IGC Florence in 2004 or confine our activities to rituals and speeches by politicians, we would never again be able to catch up with the rest of the world or even China for that matter. With an intellectual President and PM at helm, it would indeed be befitting, if our geoscientists become missionaries of geotourism in the country in a manner it is done in the rest of the developed world. If we miss this opportunity we would have missed a great opportunity to awaken and educate the masses and school teachers as well as students. In the long run, it would mean unexplored minerals, unmanaged disasters,

groundwater and environment and un-harnessed commercial value of geoheritage of our vast lovely landscape and its bountiful grandeur. Proper management of this three-year global geofestival is vital for our country as well as for the entire planet. No industry anywhere survives without mineral resources. There are no safe cities and villages in the hills or coasts without every citizen being naturally enlightened about the rocks he treads on, as these were once alive and are so even today in so many ways. All wars have been geoheritage-based; geopolitics is linked to what minerals lie beneath the landscape. Experts cannot be created overnight but need to be created on war footing with a vision for future. Creating amateurs is achievable globally in these three years, through an active geoscientist–society interface. The least we could do is to make science popularization lucrative and respectable. Our vast manpower of retired geologists as well as serving ones has to be cast into a socially vibrant system. Western science has grown on the strength of centuries of science club activity. Geoparks and geosites can become our modern science clubs if maintained and manned with urgent top priority dedication. Geoheritage ignored is commercial wealth lost. The UNO initiative is an opportunity to leapfrog. All future tsunamis, flash floods and global sea level rises require a globally enlightened vision at every village and school level. We cannot afford to fail and fail we would, without human awakening at all levels.

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