

excitation wavelength of 506 nm. The spectrum showed an emission maximum at 615 nm, characteristic of ethidium bromide.

This method may not be applicable for a compound which binds to DNA exclusively by electrostatic mechanism since the phosphate sites will not be available to CTAB for subsequent precipitation. The method is ideally suited for intercalating compounds or for compounds strongly binding to DNA by non-electrostatic mechanisms. We

have extended this method to test various compounds including an alkaloid, deoxytubulosine, isolated from the flowers of *Alangium lamarckii*.

1. Long, E. C. and Barton, J. K., *Acc. Chem. Res.*, 1990, **23**, 271-273.
2. Harvey, R. G. and Geacintov, N. E., *Acc. Chem. Res.*, 1988, **21**, 66-73.
3. Kumjappu, J. T. and Nair, C. K. K., *Indian J. Chem.*, 1992, **A31**, 432-435
4. Pasternack, R. F., Caccam, M., Keogh, B., Stephenson, T. A., Williams, A. P.

and Gibbs, E. J., *J. Am. Chem. Soc.*, 1991, **113**, 6835-6840.

JOY T. KUNJAPPU*
S. R. VENKATACHALAM**
C. K. K. NAIR**

*Chemistry Division
**Bio-Sciences Group
Bhabha Atomic Research Centre
Bombay 400 085, India

OPINION

On the recentness of current researches in earth science in India

Salil Agrawal and Vinod Agrawal

The questions pertaining to the output of our community of geo-scientists, in terms of effort and money spent by

them, customarily, and perhaps because it is convenient too, are replied with the 'number' of research papers published

by them. The harder question of the quality of research remains unanswered, mostly getting drowned in the debate

Table 1. Frequency tabulation for references cited

Class	Class limits (both years included)	50 research papers published in India in the year 1991*		50 research papers published from abroad in the year 1991**	
		Frequency	Relative percentage	Frequency	Relative percentage
	In or before 1931	11	01.114	25	01.014
1	1932-36	4	00.405	4	00.162
2	1937-41	7	00.709	10	00.406
3	1942-46	5	00.507	6	00.243
4	1947-51	7	00.709	17	00.690
5	1952-56	19	01.925	23	00.933
6	1957-61	35	03.546	40	01.623
7	1962-66	60	06.079	57	02.312
8	1967-71	119	12.057	153	06.207
9	1972-76	155	15.704	245	09.939
10	1977-81	182	18.440	476	19.310
11	1982-86	227	22.999	742	30.101
12	1987-91	156	15.805	667	27.059
Total		987	100.00	2465	100.00

*Selected from:

1. *Journal of Geological Society of India*. 2. *Indian Journal of Earth Sciences*. 3. *Indian Journal of Geology*
4. *Indian Minerals*.

**Selected from:

1. *Contributions to Mineralogy and Petrology*. 2. *Mineral Deposita*. 3. *Geological Magazine*. 4. *Journal of Petrology*.

involving subjective assessment of either the 'standards' of respective publishers or the relevance of the work (pure versus applied) or both¹. There is thus a need for an unbiased estimator, unrelated to the so-called 'goodwill' of publishers etc., to assess the quality of our research. An insight into the quality of our research, as a whole, can be gained by examining the number of recent works quoted in our research papers as compared to the world at large.

For this, a sample of 50 research papers each was randomly drawn (by generating pseudorandom numbers) from all research papers appearing in four journals published in India and four from abroad in 1991. Data on references quoted in both sets of research papers are summarized in the form of frequency distribution for the last 60 years, with a class interval of 5 years (Table 1).

The picture which emerges from the above table is highly revealing and, far from being flattering, is rather damning. To understand the implications of the information in Table 1, first contrast the total 987 references quoted in 50 papers published in India with the 2465 for the same number of papers published from abroad, yielding an average of 20 and 50 references per paper respectively. While it certainly reflects the relative zeal of the two groups to learn and incorporate whatever that has already been published in their respective fields, one wonders if it does not as well reflect the relative tendency of the two groups to honour the concept of copyright, to accord due credits. Secondly, notice that references older than 1971, i.e. 20 years, account for 27% in Indian research papers as compared to the 13.6% in papers from abroad. Thirdly, also notice that work done/reported in

Table 2. Absolute frequencies of references cited in a set of 50 research papers, each published in India (column 1) and from abroad (column 2) in 1991

Year	(1)	(2)	Difference factor
1991	4	32	× 8
1990	13	88	× 6.7
1989	31	184	× 6
1988	54	170	× 3.1
1987	54	193	× 3.6
Total	156	677	× 4.3

most recent years, i.e. in the last 5 years, accounts for only 15.8% in Indian research papers as compared to the 27% in western literature, the figures for the last 10-year interval being 38.8% and 57.1% respectively.

The focus on significance of the observations made above becomes sharper when a year-wise frequency distribution for the last five years, beginning 1991, is considered (Table 2). An almost complete blackout of contemporaneous works in our research papers is too obvious. Here one can, with some justification, argue that library facilities in India are extremely inadequate. Yet conceding this argument would only serve to legitimize and perpetuate the malady.

In the national science scenario, if the field of earth sciences, instead of being in the forefront, appears to be 'waiting in the corridor, unheard and unrecognized'¹, the blame, of course, rests squarely on us, we the writers and the publishers. One would indeed not need any fancy, sophisticated instruments at enormous costs to visit a library. Similarly, merely having words like 'Current...' or 'Recent...' in the

titles of our journals would not suffice. We have the following two suggestions to make to the publishers of our journals:

(a) The percentage of citations made in an article for the last 10 years should be indicated in a box right above the title of the article, under the heading Update Index (UI). The authors should be made to supply the figure along with the manuscript. The update index would serve two purposes. First, it would make the authors themselves conscious of the aspect and, secondly, a look at the figure would tell a discerning reader whether the article incorporates recent works or not.

Proof: A review paper of Gupta *et al.*² contains as many as 84 citations, yet for the last five years there is none, for the last 10 years there are only 6 citations, yielding an update index of 5. Compare it with the statistics of even the Indian papers alone (Table 1). Interestingly, all authors are from the Geological Survey of India, considered to be bestowed with one of the richest (earth sciences) libraries in India.

(b) It should be made an editorial policy of every journal not to accept an article with an update index less than 50, unless otherwise explained by the author(s).

- 1 Radhakrishna, B. P., *J. Geol. Soc. India*, 1991, 37, 325-328.
- 2 Gupta, S. N., Mathur, R. K. and Arora, Y. K., *Rec. Geol. Surv. India*, 1992, 115, 63-85.

Salil Agrawal is in the Department of Geology, University of Rajasthan, Jaipur 302 002, India, and Vinod Agrawal is in the Department of Geology, M. L. Sukhadia University, Udaipur, India

Constraints affecting development of an integrated strategy for environment and development issues

Alok K. Srivastava

Rise in human population, growth of technology, industry and agriculture during this century have been associated

with progressive degradation of the quality of global environment. There has been a rapid over-exploitation of the

renewable and non-renewable natural resources and presently the living and waste disposal spaces overlap each