availability of toposheets of the restricted category. This has placed a major impediment to progress without serving the security needs. Even geological maps without physiographic details, pertaining to restricted areas, prepared by the Geological Survey of India need clearance from the Ministry of Defence prior to their publication. In many cases, latitudes and longitudes are deleted and in some cases even exclusion of scale for the map is suggested making a mockery of the geographical information system and reducing the utility of geological maps. This practice of restriction on such valid geological information has placed India in poor light among the comity of nations. Despite extensive cartographic, geodesic, geophysical and aerial coverage of India, there is an awful paucity of essential information made available to needy scientists, research workers and organizations within the country as to imperil the scientific progress of the country. The restriction on toposheets has deprived mountaineers, whose forerunners in the past prepared the most remarkable maps of inhospitable terrains, of the essential map information of the Himalayan regions.

Is restriction relevent

As scientists we have to examine whether this restriction of toposheets by the Ministry of Defence is justified and how relevent it is in the present scenario. Satellite photography has now revolutionized the mapmaking processes, and some of these satellites have very high resolution. India is planning to launch a satellite capable of providing resolution of 2.5 m in panchromatic band, and an American Company, EOSAT is launching one that would offer 1 m resolution. Thousands of satellites are encircling the earth and these can recognize roads, buildings, installations, water bodies, rail lines, telephone lines, trees, vegetation, nature of crops, berthing of ships, airports, rocks, soil, dams, and canals besides providing a variety of remote sensing data. All this information is accessible through foreign commercial remote sensing agencies. The range and depth of satellite observation with regard to the so-called security aspects is so enormous, that the information contained in the 1 : 50,000 scale toposheets pales into insignificance. Moreover the 1 : 250,000 scale toposheets restricted by SOI due to security consideration along the external borders and coastline areas, are available for sale in London. Thus restricting toposheets has not served any purpose, other than negative impact on the working of Indian scientists.

Remote sensing techniques have brought about a sea change in vital data gathering. Almost every country in the world has access to this data which is marketed commercially by private agencies in the developed world. Satellites are capable of gathering data over a wide area and the data so available will be more homogeneous in nature than that collected through several ground stations, and are also spatially continuous. The data collected from satellites are amenable to easier processing and computation. Further, modern instruments like geographic positioning system (GPS) provide accurate location of any area with the heights. Gravity and magnetic data obtained by satellites encircling the earth are easily available. In such a scenario the question arises as to what purpose the restriction on maps and other information has served.

Conclusion

In this age of virtual explosion of technological advancement in gathering vital information pertaining to land and human activities related to the earth, and rapid dissemination of information through the Internet, the restrictions placed on toposheets and maps is ludicrous. We cannot reconcile to the rule of restriction on maps when electronic eyes from across space peer into everything on the surface of the earth. This restriction denies us our fundamental right to information, flouts the democratic principle of access to data collected at the cost of tax-payers' money and restricts our valid professional activity. Hence this has to be opposed.

Indian scientists should make it clear to those concerned that derestriction of toposheets and making available other land-related information to Indian citizens will not in any way compromise the security of the country. It is time that the entire scientific community raises its voice and gets this archaic restriction removed once for all before the advent of the next millennium and thereby earn the gratitude of all citizens.

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COMMENTARY

Journal impact factors for the individual scientist: An unnecessary evil

J. Gowrishankar

In the last several years, the entity 'journal impact factor' has begun to take on a larger than life dimension in the assessment of the quality of journals and also of the research output of nations, their constituent institutes and universities and departments, and even of individual scientists therein. So much so that I know of several scientists who base their decisions to send manuscripts to particular journals because of decimal differences in the impact factors between the different journals.

The impact factor is defined as the mean number of citations received in the current year by papers published in the journal in the preceding two years. I have recently come across two rather unrelated articles that discuss the relevance and value of the impact factor in assessment of research quality, which I wish to share with the readers.

The first[1] is a laudatory review published in *Nature* of a book authored by J. M. W. Slack, '*Eggs and ego: an almost true story of life in the biology lab*'. Unfortunately, I have not had the opportunity to read the book itself, but I quote from the review by Lawrence[1]: 'Nowadays, as Slack points out, assessment of researchers is not by the content of the articles, not even by their titles, but just by the *names of journals* in which

they are published (*sic*). Slack picks the top "fashion journals" in biology as *Cell*, *Nature* and *Science*, which have high impact factors. Yet the impact factor is determined not by the bulk of the papers in the journal, but by a few heavily cited ones. Thus, most of what the fashion journals contain is actually the same sort of thing the specialist journals carry but dolled up to look a bit special. Slack's [own] papers published in specialized journals were just as good as those [he] published in the fashion journals, both in his opinion and as measured by the citations they attracted'. Lawrence also states that 'in a creative industry like research, where real discoveries are always ahead of their time, these measures [such as the impact factor] are at best crude'.

The second article I wish to cite is a commentary[2] by Graham Walker, editor-in-chief of the *Journal of Bacteriology* and I quote some excerpts: 'It is strikingly obvious how biasing one's editorial decisions to favor only fast-moving areas of research ... could greatly increase a journal's impact factor ... [On the other hand,] we publish truly the best papers in the field but do not bias our decisions by considering the perceived popularity of the topic .... The enduring legacy of this editorial tradition has been the publication of important papers that continue to generate citations for many years'. Walker then provides data which show that: (i) approximately 2200 articles published in *Journal of Bacteriology* in 1995 and 1996 garnered 7700 citations in 1997, for an impact factor of 3.5; (ii) these 7700 citations represent only 17% of the citations in 1997 to all papers published in the journal, with the remaining 83% (which one may call the 'forgotten citations') citing papers published in 1994 and the years preceding; and (iii) there were, respectively, around 2000 and 2400 citations in 1997 to the 900 papers published in 1988 and the 1000 in 1989, for an 'endurance impact factor' (my own jargon) of 2.3. So then, should we say that there are the hares as well as the tortoises among the different journals?

In our country, some scientometrists and science administrators have gone one step beyond the impact factor to employ derivatives, such as average impact factor per paper published (which in my opinion is nonsensical), to compare the research outputs of different institutions. One wonders whether to such a science establishment (as Lawrence[1] puts it), 'the real purpose of the endeavours becomes forgotten and it devotes itself, not to making the important measurable, but to making the measurable important'.

1. Lawrence, P. A., *Nature*, 1999, **397**, 487–488.
2. Walker, G. C., *J. Bacteriol.*, 1999, **181**, 1–3.

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A potential biocontrol agent for pigeonpea cyst nematode (*Heterodera cajani* Koshy)

Cyst nematodes are soil-borne plant pathogens capable of causing destructive plant diseases. These plant pathogens produce survival structures called cysts (Figure 1 *a*), which are actually dead females. The females upon laying their eggs gradually undergo morphological changes and become protective cases for the eggs. Cysts remain viable for many years in the soil. Thus, once introduced in a cultivable area, it is difficult to eradicate them, the best example being that of potato golden cyst nematode which since it was spotted in the Nilgiris, Tamil Nadu in 1961 (ref. 1) still remains a major constraint to the cultivation of potatoes[2].

Pigeonpea cyst nematode, *Heterodera cajani* was first reported on pigeonpea (*Cajanus cajan* (L) Mill.) from India in 1967 by Koshy and was earlier described as *H. trifoli*[3]. Apart from pigeonpea, it has a vast host range including many other legumes, viz. greengram, blackgram, moth bean, cowpea and an oilseed crop sesamum. The second stage juveniles upon emergence from the eggs infect the host plant root system through their stylets. The root system initially shows white females which upon death become brown cysts containing eggs and juveniles. The plant gradually losses its vigour, grows poorly and yields less depending upon the initial nematode density. The yield reductions have been reported to be up to as high as 80% (ref. 4). The pathogen is fast becoming a serious threat to pigeonpea.

The cysts are highly resistant to pesticides and tolerate adverse edaphic factors. With research efforts to get host plant resistance remaining scarce, biological control techniques offer a good option in the management strategy against *H. cajani*. Biocontrol agents in addition to being cheap and effective are the safest in terms of environmental considerations and warrant relatively less technical skill for their application. Walia *et al.*[5] reported an actinomycete *Pasteuria penetrans* infecting second stage juveniles of *H. cajani*. *P. penetrans* is an obligate parasite and is not culturable on synthetic growth media. Methods to mass multiply *P. penetrans* have been fraught with difficulties. Thus with the above considerations in mind, a study was undertaken to isolate native antagonistic fungi from the field soils since natural enemies will be effective in combating this nematode. Earlier reports indicate that egg parasitic fungi are more effective against soybean cyst nematode[6]. Hence, the study was confined to the isolation of fungal endoparasites of cysts and eggs.

Field soils from Gulbarga district, Karnataka, where pigeonpea monocropping is practised were processed for cysts of *H. cajani* as per the standard sieving and decanting procedure of Cobb[7]. Cysts were then surface sterilized with 1% sodium hypochlorite solution and placed on potato dextrose agar (PDA) medium in petriplates aseptically. The plates were incubated for three days at room temperature and then observed for