Publish in foreign journals and prosper, or in Indian journals and perish

A recent bibliometric study showed that Indian researchers in the subject area of chemistry published their best research in foreign journals[1]. The quantification of how the 'best' work is shared between international journals and Indian national journals was performed using an exergy parameter which has been recently introduced[2]. It is believed that exergy, which is an energy-like term obtained from the product of impact ($i = C/P$, which is a quality term) and citations C (a term that has both quality and quantity attributes) is the best single, scalar indicator of scientific effort[2].

In this note, we follow up the previous preliminary study by examining the trends in other disciplines as well, and also the publication patterns across leading research institutions and agencies in the country. The methodology adopted in the previous study is followed[1]. From the *Web of Knowledge* (http://apps.webofknowledge.com/), all the papers which show at least one Indian institution in the address for the year 2000 (publication window) are taken and their citations during the window (2000 till date: searches done on 30 April 2011) are counted. For each category (disciplinary area or institution, as the case may be), the number of papers (P) in 2000 and the number of citations (C) collected during the citation window (2000–2011) are used to compute the exergy value[2] $X = (C/P) \times (C)$. The total $\sum X$ for international and Indian journals is then added separately. The values of $\sum P$, $\sum C$ and $\sum X$ for the international journals and national journals are compared. The same exercise is repeated for all papers published in 2005 (the publication window is for the year 2005 and the citation window is now from 2005 till date: search done on 30 April 2011).

Chemistry accounts for the greatest share of published research in India as recorded in the *Web of Knowledge* from 2000 to 2005 across various disciplines and this share has increased from 2000 to 2005 (in exergy terms, from 34.14% to 40.70%). Agriculture has the least share and this has only decreased from 2000 to 2005 (in exergy terms, from 3.24% to 1.74%). Supplementary tables are available from the authors on request.

Table 1 shows how the 'best' research from India is shared between foreign and Indian journals discipline-wise in exergy terms. Confirming the trends reported earlier for chemistry[1], for all other disciplines as well, nearly 99% of the 'best' research from India appears in international journals. When one compares the ratio of quality of research published in foreign journals to Indian journals as measured by impact $i = C/P$, the 'better' quality work from India appears in foreign journals. The ratios $i(F)/i(I)$ range from 2.04 in biology in 2005 (i.e. P window 2005; C window 2005–April 2011) to 11.13 for agriculture in 2001 (i.e. P window 2000; C window 2000–April 2011). Leading Indian institutions dis-

Table 1. The share of 'best' research between foreign and Indian journals discipline-wise

	Foreign journals			Indian journals		
Subject	%P	%C	%X	%P	%C	%X
P window 2000; C window 2000–April 2011						
Agriculture	46.33	90.57	99.07	53.67	9.43	0.93
Biology	89.05	95.86	98.51	10.95	4.14	1.49
Chemistry	75.83	93.66	98.58	24.17	6.34	1.42
Engineering	84.99	96.75	99.37	15.01	3.25	0.63
Medicine	79.79	94.78	98.82	20.21	5.22	1.18
Physics	91.71	98.24	99.65	8.29	1.76	0.35
Grand total	79.35	95.43	99.13	20.65	4.57	0.87
P window 2005; C window 2005–April 2011						
Agriculture	55.57	91.80	99.01	44.43	8.20	0.99
Biology	91.28	95.53	97.76	8.72	4.47	2.24
Chemistry	81.91	96.27	99.32	18.09	3.73	0.68
Engineering	91.95	97.93	99.49	8.05	2.07	0.51
Medicine	84.49	94.35	98.08	15.51	5.65	1.92
Physics	88.51	97.93	99.66	11.49	2.07	0.34
Grand total	84.86	96.24	99.15	15.14	3.76	0.85

Table 2. Publishers favoured by Indian authors for publishing their best work

Publisher	X-2000	X-2005	%X 2000	%X 2005
Elsevier	767,302	873,981	33.71	46.41
American Chemical Society	373,166	281,932	16.39	14.97
American Physical Society	249,450	192,555	10.96	10.22
Wiley	120,368	111,020	5.29	5.89
Royal Society of Chemistry	97,632	87,811	4.29	4.66
Springer	214,375	65,627	9.42	3.48
Institute of Physics	36,717	27,975	1.61	1.49
Oxford University Press	32,951	25,652	1.45	1.36
American Institute of Physics	65,863	22,552	2.89	1.20
Taylor & Francis	41,146	22,375	1.81	1.19
Thieme Verlag	30,600	15,057	1.34	0.80
Lippincott Williams and Wilkins	9,275	12,621	0.41	0.67
Indian publishers	17,507	12,079	0.77	0.64
Nature Publishing Group	4,294	11,884	0.19	0.63
American Society Microbiology	60,553	9,691	2.66	0.51
IEEE	17,814	5,753	0.78	0.31
Portland Press	10,575	4,004	0.46	0.21
OSA	9,246	2,993	0.41	0.16
Rest of International journals	117,561	97,742	5.16	5.19
Total	2,276,395	1,883,305	100	100

tributed their 'best' research between foreign and Indian journals in 2000 and 2005 in percentages that ranged from 100 (Cochin Univ. Sci. & Technol. in 2005) to 88 (ICMR in 2000). That is, only a few premier agricultural and medical institutions have sent a noticeable percentage (not more than 11) of their best work to Indian journals. Table 2 shows the major publishers favoured by Indian authors for publishing their best work. Nearly half appears in the journals of one single publisher, namely Elsevier. Only 0.64% appears in journals produced by Indian publishers which are indexed in the *Web of Knowledge*. In 2005, ICMR journals accounted for slightly more than 60%, CSIR journals for nearly another 20%, and the Indian Academy of Sciences journals for approximately 5% of this meagre 0.64% share.

1. Nishy, P., Parvatharajan, P. and Prathap, G., *Curr. Sci.*, 2011, **100**(11), 1604.

2. Prathap, G., *Scientometrics*, 2011, **87**(3), 515–524.

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Observations on the spider cache of mud-dauber *Sceliphron* sp. nest

It is well known that mud-dauber wasps *Sceliphron* spp. (family Sphecidae) paralyse spiders and store them in their nests as food provision for their offspring. The species differ in their number of cells in a nest, the number of spiders provisioned in a cell, and the number and preference of spider species collected for provisioning[1].

On 2 July 2011, we observed six spiders that appeared paralysed being carried away by ants on the kitchen floor of an apartment. The source of these spiders was a mud-dauber wasp (*Sceliphron* sp.) constructing a nest on the central ceiling fixture (Figure 1 *a*). The identity of the wasp species could not be ascertained, as it was not collected. All the six spiders belonged to the family Araneidae (Figure 1 *b*). Over the next few days, the wasp completed its nest and all the cells were sealed. In all, there appeared to be five cylindrical cells.

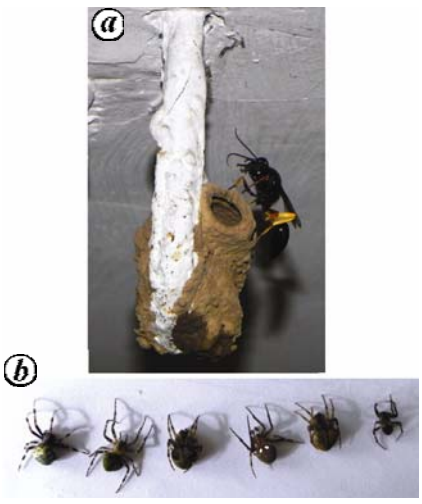

Figure 1. ***a***, *Sceliphron* sp. building a nest. ***b***, Spiders discarded by *Sceliphron* sp. while building the nest.

In the second week of September, some of the cells were open indicating emergence of adult wasps. On 14 September, the nest was removed and a few spiders spilled out. The nest was collected on a sheet of paper and the contents were sorted. Two empty cocoons were found, indicating that at least two adult wasps had emerged. Since the nest was damaged while removing, the state of other cells could not be ascertained. In one of the cells, however, a small, live larva was also present. Perhaps, it did not develop properly.

In addition, a surprisingly large number of spiders was stashed inside. The nest was disturbed carefully and all the spiders were separated from the hardened mud. Further, the entire mud was dissolved in water so that any remaining spiders could float. Since the cells were disturbed, we could not keep a cell-by-cell count of the spiders. The entire nest contained 104 spiders (Figure 2). Of these, 92 spiders belonged to a certain species of Uloboridae, 9 to a species of Theridiidae, 1 individual of Araneidae (*Neoscona nautica*) and 2 others which could not be identified as they were damaged.

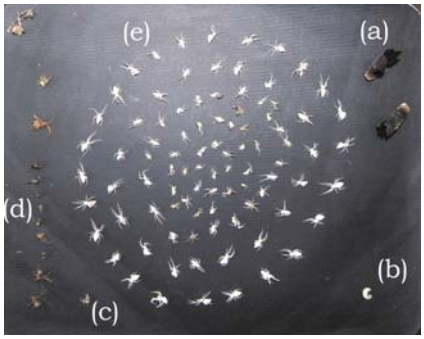

Figure 2. Sorted contents of the *Sceliphron* sp. nest: (a) Cocoons of the emerged wasps; (b) Live, undeveloped larva; (c) Exoskeleton of a spider; (d) Theridid spiders; (e) Uloborid spiders.

Interestingly, one spider exoskeleton was also found. Is it possible for a paralysed spider to recover and moult inside a nest? It has been speculated that the spider was about to moult when it was captured by the wasp and ultimately it moulted inside the nest (G. N. Vankhede, pers. commun.). But there is evidence that the wasp venom acts on the spider as a tranquilizer only and its effect subsides with time[2].

The initial observation showed that wasps may discard some spiders even after capturing them and bringing them to the nest. But why would a wasp invest energy in capturing, paralysing and carrying the spiders only to discard them ultimately? That too when later observations suggested that wasps specialized on a particular spider to a great extent? Still more curiously, why do the discarded spiders belong to a particular family?

Since the wasp larvae consume all the edible parts of a spider[3], it could be speculated that the 92 intact individuals of Uloboridae were stored for the single undeveloped larva. By extrapolation, the wasp might have stored at least 270 individuals of this spider inside the nest for its entire brood of at least three larvae.

The tendency of the wasps to collect individuals of a particular spider species is clearly established[1,4]. It is even clear that wasps use cuticular chemical cues to