

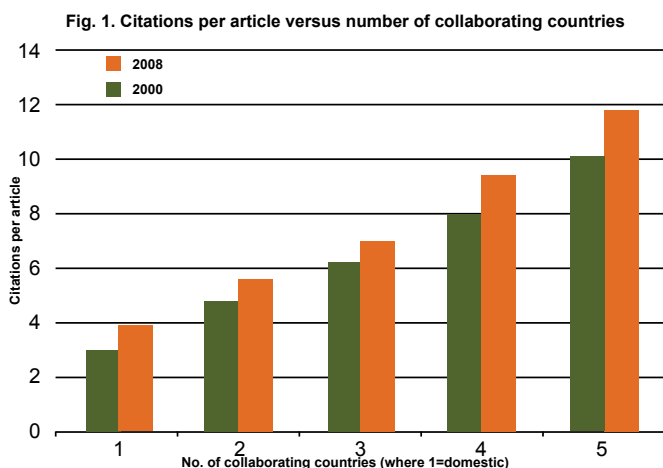
International R&D Collaboration

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Science is largely funded at the national level, but is nevertheless a global enterprise. According to a recent report published by the Royal Society¹ there are an estimated seven million researchers across the world, utilizing a total of US \$ 1,000 billion of international R&D budget, and publishing their research results each year in approximately 25,000 scientific journals. The motivating factors for collaboration are several and varied: the wish to work with the best people and facilities; the possibility of generating new knowledge to advance the field; or to tackle specific problems. A further important factor that often determines the need to collaborate is to reap the benefit of scale. A case in point is the area of genomics, where sharing the burden of research activity by breaking down complex tasks into manageable pieces can be invaluable. For example, Indian researchers recently joined the International Cancer Genome Consortium whose avowed goal is to obtain a comprehensive description of genomic, transcriptomic and epigenomic changes in 50 different tumour types. India's focus will be on oral cancer – in particular gingivo-buccal cancer – as a part of the Consortium activities.

Sometimes, collaboration is necessitated by external factors entirely unrelated to the science itself. The worldwide public health emergency caused by the epidemic threat of Severe Acute Respiratory Syndrome, or SARS, triggered the coming together of an international network of clinicians, epidemiologists, microbiologists and many others through the World Health Organization. Clearly, the global challenges of the 21st century appear to be drawing researchers together to combat broad issues that require a collaborative approach.

India has been a slow starter in the international collaborative R&D arena¹. The country's level of collaboration, measured as a fraction of the national domestic output, is lower than that of other emerging nations such as Brazil and much lower than those in established G8 partnerships². Possibly, one can attribute this to India being less well connected to international networks than other countries. The good news, however, is that this is a great opportunity for India to expand its collaborative base. Indeed, Indian scientists have begun to reach out to a wider range of countries today than even a decade ago³.



This leads us to the next question: How useful are joint authorships? In terms of citations, it seems that for each international author on an article, there is a corresponding increase in the impact of that paper, up to a tipping point of around 10 authors (Fig.1)¹. It is perhaps valid to argue that a multi-author paper has a 'network effect' (and therefore gets more citations); it is not necessarily of a higher quality than those that are cited less. Even so, citation is a commonly used indicator of how well 'used' a piece of research may be.

Interestingly, it would appear that not all country partnerships are equally valuable; certain country 'pairings' deliver significant benefits to the partners involved, as can be seen from Table 1. The Table illustrates country collaborations that have resulted in threefold increase on the publication's impact as against that of a standard domestic publication. India, for example, achieved its strongest impact factors while collaborating with France and Italy. Similarly, Chinese authors quadrupled the standard impact of their papers when working with Russia. It is perhaps not surprising that the leading collaboration 'hubs' such as USA, UK, France and Germany

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have a significant impact on the citation rates, given the density of scientists and the citation rates generated within these countries. Obviously, they derive great benefits working together and with other partners. This knowledge is particularly helpful when mapping out strategic R&D linkages with other countries.

TABLE 1. COUNTRIES (COUNTRY Y) WHICH ACHIEVED A THREE FOLD INCREASE ON THEIR STANDARD DOMESTIC PUBLICATION IMPACT, THROUGH COLLABORATION WITH 'COUNTRY X' (YEAR 2008)

Impact accrued by (Country Y)	By collaborating with (country X)																						
	Australia	Austria	Belgium	Canada	China	Czech Republic	Finland	France	Germany	India	Israel	Italy	Japan	South Korea	Netherlands	Norway	Russia	Spain	Sweden	Switzerland	United Kingdom	United States	
Argentina																						3.2	
Australia																							
Brazil	4.5			3.1									3.7		3.9						3.2		
China			3.8					3.6	3.5	4		5			3.9		4.1	4.8	3.5	4.2	3.1	3.2	
Czech Republic															3.9						3.1	3.2	
India								3.8				3.7											
Japan																		3.3		3.1			
South Korea								3.8	3														
Mexico									3.1			3.4											
Poland		3.2	3.8	3.6											4.1								
Russia				4.7	3.4	3.4	3.4	3.2	3.1		4.8	3.7	3.6	4.5	4.4	3.6		4.2	4	4.2	4	3.6	
Slovakia																						3	
Spain	3.5												3.2										
Taiwan									3.2														

minimum of 1,000 papers published by each country in 2008

In today's knowledge economy, no country can afford to isolate itself. It is now being increasingly recognized that international partnerships are imperative in tackling problems with global consequences in food-, health-, energy- and environmental security. In life sciences, transnational alliances with both public- and private sector collaborators are also vital for joint IP generation, harmonization of regulatory processes, smoothening trans-boundary movement of biologicals, and to leverage better markets for biotech products and processes. For India, international collaboration is no longer about money: it is more about access to technology, capacity building, learning the best practices, and setting up and reaching global benchmarks. Therefore, while India continues to provide strong support to its home-grown R&D, it must also ensure that enough flexibility is built into the system to soak up global experience and expertise. This will, in turn, pave the way toward building a nation that is confident of both receiving and contributing at the global level.

In this issue of Biotech News, we feature an article on the 'New Indigo Project' under the European Research Area Network (ERA-Net). The programme was launched in 2009 to enhance EU-India cooperation in S&T through a series of networking activities and joint funding of collaborative research. DBT has been partnering with European funding agencies (from Austria, Germany, France, Spain Portugal, The Netherlands and Turkey) on one of the ERA-Net networking pilot programme on biotechnology and health. The article by Blasy et al. (P. 64) brings out the power of such partnerships. We also bring you a freewheeling interview with Dr Chittranjan Bhatia, former Secretary, DBT (P.69). Bhatia was at the helm during a short but eventful period of DBT's history (1993-95). Five very distinguished personalities – M. Vijayan, R. S. Paroda, Kiran Mazumdar-Shaw, V. P. Kamboj and P. N. Tandon –who contributed toward shaping DBT's policies and programmes – reminisce about interesting events and anecdotes (Pp.72-84). Also, departing from our usual practice of featuring one institute in our profile section, we present you (P.86) a combined profile of the Regional Centre for Biotechnology and Translational Health Science & Technology Institute, as they are components of a comprehensive biotech science cluster taking shape at Faridabad.

Happy reading!

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¹ Knowledge, Networks and Nations: Global Scientific collaborations in the 21st Century, The Royal Society, 2011;

² Adams J et al., Global Research Report: India, Thomson Reuters, 2009;

³ Bound K, India: The Uneven Innovator, Demos, 2007