Services, CMFRI, CDRI, NIO) funding research on marine bioprospecting. Indian drug and pharmaceutical industries have increased their R&D spending by 400% in the past 4 years[6]; however, they still spend only one-tenth of their revenues on R&D against 20% by western companies.

An obvious corollary of the high cost of drug research is that companies will invest only in R&D activities that ensure high returns if a successful product emerges[7]. New drug discovery and development is still in its infancy in India, and at present no Indian-based company has the financial muscle to compete with the multinationals[7]. Any new drug development needs an investment of about US$ 500 million per product and minimum development period of 8–12 years, with a final success rate of less than 0.01%.

Based on the potentially large health benefits to society, the governments should encourage and support the search for drugs from sea and increase R&D investment on marine biotechnology and marine biomedical field. It is time that our agencies and institutions recognize the magnitude of the problem and the all-too-obvious limitations of our laboratories[7]. Indian university curricula need to include chapters on bioprospecting. Creating an autonomous body such as 'Indian National Centre for Marine Natural Products' manning a nationwide network of units can have a revolutionary effect on the discovery of new therapeutic molecules in India for human sustenance.

Considering the survival benefits to mankind, does not deep sea exploration deserve as much attention as the Indian lunar surface exploration?

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C. REGUNATHAN[1,*]
M. R. KITTO[2]

[1]*Al Oula Marine Consulting, Post Box No. 668, Safat 13007, Kuwait*
[2]*Futaisi Organic Foods, Box 18, Abu Dhabi, UAE*
**e-mail: drregu@gmail.com*

Online herbaria or national flora: what is needed first?

Datar and Ghate[1] aptly describe the need for online herbaria in India. In addition to housing plant collections, many herbaria have initiated computerized data information system to record and access the information on plant specimens, as well as to access information from other herbaria worldwide[2]. The initiative in India by Agharkar Herbarium (AHMA) deserves appreciation. Sasyabharthi, Sampada, Herbaceous Plants of Baroda, etc. are other efforts in this field and their status and limitations have already been reviewed[3,4].

In this context, the Botanical Survey of India (BSI) has come up with a thematic proposal for an online digital herbarium of the entire country[3]. But before working on the online herbarium, we must first complete our baseline data of floristic diversity of India in the form of a complete national flora.

J. D. Hooker and his associates produced *Flora of British India* (covering flora of India, Pakistan, Bangladesh, Myanmar, Sri Lanka, Nepal, Malayan Peninsula, Bhutan, Tibet, etc.), describing 14,312 species of flowering plants in a period of 25 years (1872–1897)[5]. Since its publication, many new species, genera and even few families have been added to the flora of India, but this book is yet to be revised. After independence, our country has made appreciable progress in all fields of science. Presently it is encouraging that on one side we are able to send *Chandrayaan* to Moon and succeed in proving presence of water there, but on the other side it is equally embarrassing that we are not able to produce a national flora indicating the presence of certain flowering plants in our own country. Even countries as big and diverse as Russia, China, Australia, etc. have completed their national floras and much of the information is available on the web.

Serious efforts for producing *Flora of India* in 32 volumes were started by BSI[6] in 1986 and few volumes (introductory volumes, vols 1, 2, 3, 4, 5, 12, 13) were published during 1993–2000 with good quality information. But the task is still unfinished and no new volume has appeared during the last 8 years. The synthesis of information from enormous herbarium collections available with BSI (3 million) and other herbaria (1.2 million)[3] is delayed, as it seems, due to diversion from the principal aim of preparing a modern up-to-date account of the flora of India. On a national scale we do not even have a checklist of flowering plants; what exists is a checklist of monocots[7] only, accounting for 4081 species which is less than one quarter of the floristic wealth of India. Regarding the number of flowering plants, different figures are quoted such as 15,000 species[8], 16,809 species[5], 17,000 species[9,10], 17,500 species[11], 18,000 species[4], 20,247 species[12], etc.

Another embarrassment to plant taxonomists is lack of complete information about our threatened flowering plant species. BSI came up with valuable datasets on 622 species of threatened plants of India in three volumes of *Red Data Book of Indian Plants*[13] but this subject, similar to *Flora of India*, also lost its priority and subsequent volumes (vols IV and V) are awaited since 1990. Meanwhile, another publication[14] from BSI itself came up with a new list of 1215 species of threatened flowering plants of India as mentioned in *IUCN Red Data Book*. It is just a list and needs to be worked upon to provide detailed information about these species. Similarly, a website of the Ministry of Environment and Forest, Govt of India (www.envfor.nic.in/bsi/) has given a list of 1017 threatened flowering plants in India. Obviously there is no unanimity about the number of threatened flowering plants in India.

Considering these embarrassing lacunae in prime information about flowering plants alone at the national level, our priorities in the field of plant taxonomy/floristics should be as follows:

- Publication of national flora in the form of remaining volumes of *Flora of India* and compilation of a checklist of flowering plants of India must be considered top priority.
- The second priority must be given to publication of complete datasets on threatened flowering plants of India with compilation of a unanimous list of these species. This information may be uploaded on the existing website of the Ministry of Environment and Forest, Govt of India (www.envfor.nic.in/bsi/) or ENVIS centre on floral diversity, BSI (www.envis.nic.in).
- As it is a marathon task to digitalize 4.2 million (and continuously increasing) herbarium sheets available in Indian herbaria, only a synoptic online herbarium of all flowering plant species of India may be prepared initially. It will require digitalization of only 50,000–60,000 sheets if three different sheets of a species are included in it. This online herbarium will extend immense help to scientists who due to absence of standard herbaria at hand, are unable to identify many of their specimens.

All these three tasks can be authoritatively completed only by BSI, which requires adequate strengthening in the form of enhanced human resources, funds, autonomy and a focused approach.

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D. S. RAWAT

Department of Biological Sciences,
College of Basic Sciences and Humanities,
G.B. Pant University of Agriculture and Technology,
Pantnagar 263 145, India
e-mail: drds_rawat@yahoo.com

Trends in science and engineering output from China and India

China and India have together been called emerging giants in the fields of science and technology research[1]. Their strengths lie in (i) a large class of trained and skilled manpower, and (ii) a traditional importance placed on the importance of being a knowledge-based society. These strengths are together helping these two countries in renewed emphasis on science and engineering (S&E) research, resulting in an exponential growth in research output. We report here these two trends that are of significance and are especially important to policy makers.

Figure 1 presents data on the total S&E output from each country. Data was obtained from the Thomson ISI Web of Science database which catalogues publications from over 5000 current and archived research S&E publications. Two sets of data are presented here. First, the closed symbols (read off the *y*-axis on the left) correspond to a graph of the data pertaining to the total number of publications from India and China during the years 1983–2008. This data includes all publications where at least one author on the publication was of an affiliation from that country. Secondly, the open symbols (read off the *y*-axis on the right) represent a graph of the data pertaining to the percentage of these total publications that originated from the top 10 research producing organizations of that country. For example, for India, the list of top 10 research producers almost always included the IITs (listed as one research institution), the IISc, TIFR, BARC, etc., while it included the Chinese Academy of Sciences (listed as one research institution), Tsinghua University, Jilin University, etc. Although the list of top 10 producers could be different from year to year, it was observed that at least seven institutions featured in the list during all the years. Hence this data is a good indication of the origins of the research output in each country.

Two significant conclusions can be drawn from this data. First, India was producing nearly four times as many papers as China in 1983 whereas China produced nearly three times as many in 2008. China resumed enrolment in graduate studies in 1978 and revamped their graduate education system in 1981 (ref. 2). Today China is the largest awarder of graduate degrees in the world. Much of the progress in China's growth was realized during the 2000s when the Chinese universities and research institutions encouraged and even incentivized