

C H A P T E R 2

BEGINNINGS OF MODERN SCIENCE AND SCIENTIFIC

JOURNALS IN INDIA (1700 - 1900)

We discuss briefly in this chapter the early beginnings of science in India **starting** around 1700 **till** the end of the nineteenth century. This background will place in perspective the growth of science journals in India.

Though we begin our study from the eighteenth century, **it** is well known that some branches of knowledge **like** agriculture, astronomy, medicine, alchemy were being pursued in India much before this time. Scientific activity did not start in India all of a sudden but slowly over centuries. However, the beginning of modern science (as **it** is practised today all over the world), started in India in the 1700's with the European traders, missionaries and administrators getting interested in the natural resources of the country. Even before the British empire started its conquest over others in India (Portuguese, Dutch and French), attempts had been made to collect information

about India, specially its flora and weather and to survey the land and coastal areas. This activity was enlarged after the East India Company got a firm foothold in the country and wanted to consolidate its position.

Towards the end of the eighteenth century, the first of the organized schools/institutions came into being in India. The Royal Botanic Garden (1787) at Calcutta, an Observatory at Madras (1792) to promote astronomy, a survey school for Trigonometric work, also at Madras (1794) and the most important society of the country for a very long time, the Asiatic Society (1784) were also started during this period. The starting of this latter society was mainly to facilitate exchange ideas among those who were investigating in different fields. About thirty Europeans came together at Calcutta to form this Society, the driving force being William Jones, the founder President. The objective of the Society was to enquire into all spheres of activity of Man and Nature in the geographical area of Asia. Till the Society got its own building in early 1800, its activities were carried on at the Supreme Court building in Calcutta. The members of the Society were interested in the studies pertaining to the geography and geology

of the country. As we shall see a little later, this Society started the first scientific journal, *Asiatic Researches*, in the country, in 1832.

The Madras Observatory which functioned for over a hundred years before it was shifted to Kodaikanal in 1900, was an important centre for astronomical work in the country. Observations on asteroids and stars resulted in the discovery of a few asteroids by Pogson and the variable nature of the star R.Reticuli (Bhattacharyya, 1985).

Though investigations had started on scientific lines in the country by the eighteenth century, it was only in the following century that Indians slowly entered the field. The nineteenth century saw rapid developments, and as Majumdar says :

" The Nineteenth century was the great dividing line, and these hundred years changed the face of India far more than did the preceding thousand years". (Majumdar, 1961).

In the first two decades of this (19th) century, the education imparted to the natives was mostly limited to languages and English was not the medium of instruction, excepting at the Hindu College, Calcutta (started in 1817) where not only was English given prominence

but other subjects like astronomy, arithmetic and chemistry were also taught. The scene elsewhere changed with the Macaulay Committee recommending in 1835 the use of the English language as the medium of instruction and active promotion of western learning. A number of educational institutions came into being soon after the Macaulay report, and western science became accessible to people of Indian origin.

Three universities were established in 1857 at Bombay, Calcutta and Madras. Before this, first of the medical colleges in the country had been started at Calcutta in 1835 followed by a Medical School at Madras in 1843 and the Grant Medical College at Bombay in 1845. Engineering education also began around the same time with the founding of the Engineering Institution at Roorkee (1847), an Engineering school at Poona (1854), an Engineering College at Calcutta (Sibpur) in 1856 and the Victoria Jubilee Technical Institute at Bombay (1887).

Along with the starting of university and college education, attention was paid to consolidating different types of survey work. Towards this end, the Great Trigonometrical Survey (1818), the Geological Survey

of India (1851) and the Botanical Survey of India (1890) were started.

Around and after the middle of the nineteenth century, Calcutta had a nucleus of educationists, doctors and engineers. We should recall the efforts of Raja Ram Mohan Roy, the social reformer, who contributed significantly in the 1830's towards inducting science education in India. In 1844, four Indian doctors were sent to England for medical training. The Hindu College, Calcutta mentioned earlier became a centre for young Indians to learn about western literature and science. The college became a forum for discussion not only of new knowledge but also topics like women's education, superstition and its ill effects, proper justice, etc.

P.C.Ray, a noted Chemist of the country who got his doctoral degree in Chemistry from the University of Edinburgh describes the scene thus :

" There was ferment all round. A new world had been opened out; new aspirations were awakened. Roused from a period of stupor and stagnation, Young Bengal began to realize that there were immense possibilities in the Hindu nation. The literature of this period breathes lofty patriotism. Political associations and newspapers had also been started to give expressions to the pent-up feelings and

ventilate the grievances of a subject people."
(Ray, 1932).

Thus, we see a trend of nationalistic feelings developing among the intellectuals in the country. There emerged an intelligentsia in Bengal brought up on western education but fired with a patriotic zeal.

Mahendra Lal Sircar, an eminent doctor in Calcutta, was one among those who had strong nationalistic feeling. He also believed that introducing science in educational curriculum alone would not be sufficient and that for science to take firm roots in the country, it should be promoted at a different level too. Thus he felt the need for of institutions which could create interest in science among the masses and train scientists to undertake original research. Though various surveys had been established by then, they were all dominated by Britishers and the Indians could not, on their own, do research there. This was due to the impression among the then rulers that Indians did not have sufficient training in the science. Mahendra Lal Sircar wrote an article in 1869 on the desirability of a national institution for the cultivation of science by the natives of India, in which he pointed out that the

backwardness of a country was due to the backwardness of the natives in science and that scientific research was the only salvation (Indian Association for the Cultivation of Science, 1976).

With this in mind, he established using the Royal Institution of London as a model, the Indian Association for the Cultivation of Science, in 1876. There was clearly a nationalistic outlook in his approach.

Though the Association was established in 1876, it was only after 1907 that research activity picked up at this centre. The activities of the Association during that period (1907 onwards) is discussed in the next chapter.

Towards the end of the century, Bengal became a major centre for scientific research in India. Asuthosh Mookherjee, J.C.Bose and P.C.Ray, all at Calcutta, were some of the important personalities who contributed to research and education in the country. Asuthosh Mookherjee, was really a lawyer but so deep was his interest in mathematics that he became an active member of the Asiatic Society. He gave a proof for the 25th proposition of the First Book of Euclid which was published in

the Messenger of Mathematics from Cambridge University in 1881 (Subbarayappa, 1971). He also lectured extensively at the Indian Association for the Cultivation of Science and later gave shape to the promotion of science at the Calcutta University. J.C.Bose started teaching and researching at Presidency College after completing his study at Cambridge and returning to India in 1885. He joined the Physics Department where the facilities for research were minimal. But undeterred by it, he continued to work here and contributed significantly to the study of electric waves. He published his research paper on "Polarisation of Electric Ray by a Crystal" in the Journal of the Asiatic Society of Bengal in 1896. He is well known for building a compact microwave receiver. His interest turned from Physics to Biophysical investigation and plant physiological investigation. His scientific papers appeared abroad in prestigious journals such as the Proceedings of the Royal Society and the Philosophical Magazine. He continued to work at Presidency College even after his retirement in 1915 and later at the Bose Institute (named after him).

P.C.Ray was a Chemist who had his post graduate education in England and returned to India in 1888. Like J.C.Bose, he also joined the Presidency College, but as Assistant Professor in the Chemistry department.

Ray contributed significantly as a leader in education (chemical), chemical research and chemical industry. He was an inspiring teacher.

Thus, we see that around the end of the nineteenth century, with five universities and about 170 colleges functioning, there was a growing interest in science in India. But the research activity took firm root in the country only in the present century. This will be discussed in the next chapter.

Scientific Journals:

The Global Scene

The early scientific communication was in the form of letters written by scientists to their counterparts in other cities using the postal system. These letters were distributed through clearing houses for scientific correspondence such as the salon of Father Marin Mersenne in Paris or the office of Henry Oldenburg in London. The letters were copied at these centres for further distribution and replies were sent similarly.

The communication thus received by a scientist was read out at gatherings of local scientists. (Mantel, 1980).

As the quantum of scientific research grew, it was felt more convenient to print the research findings for dissemination instead of communicating by hand-written letters. This was, perhaps, a spin off of newspaper publication.

The first scientific journal to be printed in the world was the French journal "Le Journal des Scavans" in January 1665. This was started by Denis de Sallo de la Coudrays, a counselor in France. This was followed by the Philosophical Transactions of the Royal Society (London) in May 1665. Within a few decades of starting of general journals, specialised journals started appearing, specially in the field of Medicine and a little later in other fields. By 1714, secondary journals (abstracting journals and review journals) came into existence, and the volume of publications increased very rapidly. By the end of eighteenth century, around 755 titles appeared (in all European languages) out of which 401 were published from Germany, 96 in France, 50 in Great Britain, 43 in the Netherlands. (Garrisson, 1934). This number varies slightly from the one given by the historian of science Derek de Solla Price

LE
JOURNAL
DES
SCAVANS,

De l'An. M. DC. LXV.

Par le Sieur

DE HEDOUVILLE.



A AMSTERDAM;

Chez PIERRE LE GRAND.

M. DC. LXXIX.

Figure 1

(Taken from Meadows, A.J.: *Development of Science Publishing in Europe*. Amsterdam, Elsevier, 1980)

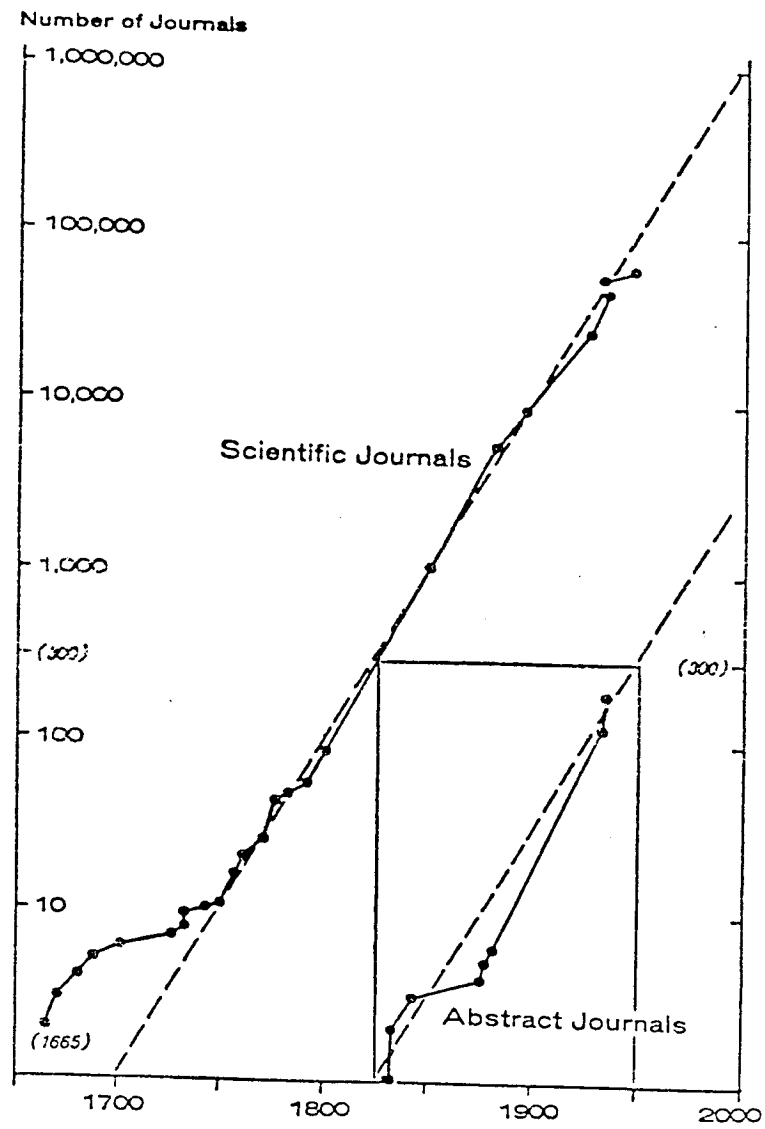
(Price,1975) which is reproduced in figure 2 wherein the number of journals founded (not necessarily surviving) as a function of date is shown. However, there was a feeling that there were too many journals. Reviewing a new journal in 1789, a writer says :

" This is truly the decade of the journal, and one should seek to limit their number rather than to increase them, since there can also be too many periodicals" (Kronick, 1976).

To get adequate exposure to work, the authors used to send their papers to more than one journal. This practice prevailed during 17th and 18th century and only later in the 19th century was it opposed by many scientists (Manten, 1980). Today such a practice is not accepted.

The dissemination of science at a popular level for the general public also got started quite early. Guardian (1713), The Spectator (1711), The Tatler (1709) were among the early ones. These were just leaflets and were published for only a short period.

In the United States, publications of the scientific journals started around 1800's. As in Europe, there were no specialized journals here also for quite some time and the journals were multi-disciplinary to begin



Number of journals founded (*not* surviving) as a function of date. The two uppermost points are taken from a slightly differently based list.

Figure 2
(Price, 1975)

with. Some of these were, the Connecticut Academy of Science and Arts Transactions(1810) American Journal of Science and Arts (1818), Scientific American (1845), and Journal of the Franklin Institute (1825). The specialized journals started with American Anthropologist (1888), Physical Review(1893) (we discuss this journal in detail in Chapter 7) and Astrophysical Journal(1895). The first Physics journal to be published from Russia was by the Russian Physical Society in 1873 and was titled Journal of the Russian Chemical Society and Physical Society.

Scientific journals both in Europe and the United States were started either by an individual, institution or a learned Academy/Society. Publication of scientific journals was a scholarly activity carried out by the academies as a part of their objectives. There was hardly any commercial angle in science journals publication till about the middle of this (20th) century barring the example of Nature (London) published by McMillan. The situation has changed dramatically now (1990), with the society publications having been pushed into the background to a certain extent by commercial publishers. This is seen very much more in Europe with a number of commercial publishers vying with each other for establishing their journals. In the United States,

learned academies and societies like the American Institute of Physics, American Chemical Society, Institute of Electrical and Electronic Engineers, still have a strong hold. But in the last few years, learned societies have got into legal battles with commercial publishers of journals (Ratnakar, 1990). In China and USSR, science publication is entirely a state controlled activity. In India, (we discuss the Indian situation in detail in Chapter 5) though it is not formally state controlled, the major portion of science journals publication is undertaken either by learned academies or Government agencies.

Some of the early periodicals of relevance to Physics and Astronomy of this period were Proceedings of the Royal Society, (London), (1854) Nature (1869), Philosophical Magazine (1789), Annales de Physique (1789), Annalen der Physik (1799), Comptes Rendus (1835), Physical Review (1893) and Astrophysical Journal (1895).

The Indian Scene

Almost one hundred and twenty-five years after the first journal was started in France, the first journal was published in India.

Asiatic Researches was the first scientific journal to be published in India. The Asiatic Society started this publication in 1788. This was a multi-disciplinary journal and was published till 1839. In 1832, the Asiatic Society started publishing the Journal of the Asiatic Society of Bengal. This journal was a continuation of Gleanings in Science which had been started in 1829 by J.D.Herbert. Though the journal included articles of a general literary kind, a number of scientific papers in different subjects like Botany, Zoology, Geology, mathematical and physical sciences were also published. An important paper in Physics that appeared in this journal was one by J.C.Bose in 1896 on "Electric Waves".

Medicine was one of the first disciplines to have journals devoted totally to that subject. A number of journals were started during the nineteenth century in the field of medicine. Indian Journal of Medical Sciences (1834), Indian Annals of Medical Science (1853), Madras Monthly Journal of Medical Science (1870) were a few of the important early publications in this field.

ASIATICK RESEARCHES:

OR,

TRANSACTIONS

OF THE

SOCIETY,

INSTITUTED IN BENGAL,

FOR INQUIRING INTO THE

HISTORY AND ANTIQUITIES, THE ARTS,
SCIENCES, AND LITERATURE,

OF

ASIA.

VOLUME THE FIRST.

CALCUTTA:



PRINTED AND SOLD BY MANUEL CANTOPHER,
AT THE HONOURABLE THE COMPANY'S PRINTING-OFFICE;
AND SOLD AT LONDON BY P. ELMSELY.
M DCC LXXXVIII.

Figure 3

Title page of the first Indian scientific periodical

The various survey departments brought out their publications. These recorded the findings of the survey. Notable among them were, *Memoirs of the Geological Survey of India* (1856), *Records of the Geological Survey of India* (1867), and *Records of the Botanical Survey of India* (1843). Some of the other periodicals started during the nineteenth century were *Transactions of the Agriculture* (1821), *Proceedings of Agri-Horticultural Society of Madras* (1839), *Journal of the Bombay Natural History Society* (1886) and *Indian and Eastern Engineer* (1858).

It may be pointed out here that during this period, there were no special journals devoted only to Physics, Chemistry or Mathematics. Papers on these subjects were published in the *Journal of the Asiatic Society*. This could, perhaps, be due to the fact that Field sciences, Medicine, Agriculture and Engineering subjects were promoted in the country much before the other subjects. It was only in the present century that journals devoted to Physics, Chemistry, Astronomy and Mathematics were started. It is observed that the majority of the journals started during that period were published from Calcutta. Table 1 lists some of the important journals started in India during the years 1700 - 1900. Though a few of the journals of this period (like the *Journal of*

the Asiatic Society, Indian Textile Journal, Journal of the Bombay Natural History Society) are still being published, except for the Journal of the Bombay Natural History Society, the others no longer command the same importance they did previously.

An exhaustive list of journals published in India during the period 1780 - 1947 is given by Kumar (1985). A comprehensive bibliography of the Indian Scientific Periodicals (1788 - 1965) is being compiled (Sen, 1988).

TABLE 1
Journals started in India during 1700-1900

| Year | Journal |
|------|---|
| 1788 | Asiatic Researchers, Calcutta |
| 1819 | Transactions of the Literary Society, Bombay |
| 1821 | Transactions of Agriculture, Calcutta |
| 1823 | Transactions of the Medical and Physical Society, Calcutta |
| 1829 | Gleanings from Science, Calcutta |
| 1832 | Journal of the Asiatic Society of Bengal, Calcutta |
| 1833 | Journal of Literature and Science, Madras |
| 1834 | Indian Journal of Medical Sciences, Calcutta |
| 1837 | Indian Review & Journal of Foreign Science and Arts, Calcutta |
| 1839 | Proceedings of Agricultural Horticultural Society of Madras |
| 1843 | Records of the Botanical Survey of India |
| 1853 | Indian Annals of Medical Science, Calcutta |
| 1855 | Memoirs of Geological Survey of India |
| 1858 | Indian & Eastern Engineer, Calcutta |
| 1867 | Records of the Geological Survey of India |
| 1875 | Indian Forester, Allahabad |
| 1886 | Journal of the Bombay Natural History Society, Bombay |
| 1890 | Indian Textile Journal, Bombay |

Source : (Arunachalam, 1979; Kumar, 1985)

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