

**INDIAN JOURNAL OF HISTORY OF SCIENCE**

**Vol. 37 No. 2**

**ISSN 0019-5235**

**June 2002**

**SUPPLEMENT**

**GROWTH OF SCIENTIFIC PERIODICALS  
IN INDIA (1788 - 1900)**

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NEW DELHI**

**2002**

*Published for :*

Indian National Commission for History of Science

by

Indian National Science Academy

Bahadurshah Zafar Marg

New Delhi-110 002

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*Printed at Nirmla Vijay Printers, B-62/8, Naraina Indl. Area, Phase-II,  
New Delhi-110 028. Tel.: 5704549*

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## **BACKGROUND & PUBLICATIONS OF SCIENTIFIC PERIODICALS**

### **(d) 1858–1876**

India came under the direct control of the Crown in 1858 following the Sepoy Rebellion of 1857, which rocked the country, especially upper and central India. Lord Canning took over as the first Viceroy and Governor General. With the assumption of direct governance of the country by the Crown came a spurt in government activities encompassing education, health, public works, agriculture, forestry, and so on.

The activity which makes this period remarkable in Indian history is, however, the medical activity occasioned by the heavy mortality in the military and civil population in India. The Crown took up the matter seriously and almost immediately set up the Royal Commission (1859) to enquire into the causes of mortality and suggest measures to remedy the situation. The Commission recommended that a public health authority with a sanitary commissioner at its head should be established [*Gazetteer of India*]. The recommendation was implemented with the establishment of the Offices of Sanitary Commission for India and three presidencies, i.e. Bengal, Bombay and Madras, and Conservancy Department in Calcutta around 1863/64. Following this event, similar offices appeared in areas like Punjab, North-Western Provinces, Central Provinces, Oudh, all in 1860s; Hyderabad Assign Districts, and Assam in 1870s. Dr Lewis and Dr D. D. Cunningham were appointed as Special Assistants to the then Sanitary Commissioner with the Government of India in 1869 to conduct research on cholera, malaria, beri beri, Kala azar, etc. All these brought about a sea change in the health scenario in the country. Numerous hospitals, sanitarium, mental asylums, charitable dispensaries came into being. Many of these started bringing out periodicals and thereby laid the solid foundation for the development of the edifice of medical periodicals in India.

In addition, numerous departments appeared at the centre, presidencies and provinces. All these developments gave rise to periodicals mostly in the form of reports.

New scientific societies, association also came up including the Indian Association for the Cultivation of Science, a purely native association

established through the initiative of Dr Mahendra Lal Sircar in 1876. Thus, the section commences with the taking over of India by the Crown and ends with the starting of the scientific association by the natives.

## **Educational Development**

Following the establishment of three premier universities, gradually degree courses such as BA and MA were introduced. Calcutta University held its first BA examination in 1858 wherein figured the following science subjects.

1. Mathematics and natural philosophy comprising arithmetic, algebra, geometry, plane trigonometry, mechanics, hydrostatics, hydraulics, pneumatics, optics and astronomy.
2. Physical sciences comprising chemistry, animal physiology and physical geography.
3. Mental and moral sciences covering logic, moral philosophy and mental philosophy.

The first M.A examination of the Calcutta University was held in 1861, then in 1862. None appearing in these two examinations could pass. However, in the M.A examination held in 1863, five out of seven students passed.

The first FA examination of the Calcutta University held in 1862 covered science subjects such as algebra, geometry, plane trigonometry and mechanics.

To train up a body of capable teachers for vernacular schools Normal Schools at places like Calcutta, Hooghly, Dacca and Gauhati were established.

Science content of the courses of Normal Schools during 1860-61 were as follows:

### ***Ist year***

1. Mathematics comprising arithmetic, mental arithmetic, geometry

(first book of Euclid with deductions), mensuration of plane surface, Mahajanee and Zemindary accounts.

2. Natural philosophy - usually covered laws of motions.
3. Botany comprising mostly description of plants.
4. Lessons on objects - *vāstuvicār*.

### *2nd year*

1. Geography.
2. Mathematics; revision of the higher parts of arithmetic; algebra up to fractions; geometry (books 1,2,3 with deductions), mensuration of solids, revision of practical surveying.
3. Natural philosophy.
4. Zoology.

### *3rd year*

1. Geography - use of terrestrial globe. Revision of the former lessons.
2. Mathematics - revision of arithmetic, algebra up to progression, geometry (books 1,2,3,4 and 6), revision of mensuration and surveying.
3. Natural philosophy - mechanical laws of motion with problems, specific gravity.
4. Human physiology [Deb Roy]

BA Course of Bombay University included a compulsory course in mathematics, and offered among optional subjects, dynamics, hydrostatics, optics and astronomy. BS Course was introduced in 1879 [Bag, p.133]

Keshab Chandra Sen founded a technical school in November 1870. Sisir Kumar Ghosh founder editor of *Amrita Bazar Patrika*, and his compatriots started the Albert Tample School of Science in April 1877, which could not flourish [Das, p.189]

The teaching of Western medicine in medical colleges during the period continued and gradually more and more students joined and newer

specialisations were added to these colleges. Calcutta Medical College, affiliated to Calcutta University in 1857 added chairs in dentistry in 1861 and hygiene in 1864. As the college became oversized, apothecary and licentiate classes were taken out and a new school started in 1873 [Subbarayappa, pp. 553-4]

Madras Medical College also got affiliated to the University of Madras, and started running two sections. The senior section led to degree level education and the junior section led to education of apothecaries and licentiates [Subbarayappa, pp. 553-4]

Grant Medical School, was running in Bombay Presidency since 1845, got affiliated to the University of Bombay in 1860 as a college for the training of graduates as well as apothecaries [Subbarayappa, pp. 553-4]

The three medical colleges running at three presidencies, Hyderabad Medical School, and a few short-lived medical colleges that appeared till mid-1850s could not meet the demand of the medical professionals in the country. Steps were, therefore, taken to establish new medical schools in various places of the country such as Nagpur (1867), Lahore (1867?), Sealdah in Calcutta (1873), Dindigul and Madura (1874), Patna (1874), Dacca (1875), Cuttack (1876), and Nellore (1876) [Crawford, pp433-51].

Engineering colleges that appeared in 1850s in the presidencies of Bengal, Bombay and Madras continued imparting education on various branches on engineering during the period. All these colleges got affiliated to the premier universities of the respective provinces. Even the Thomason Engineering College got affiliated to the University of Calcutta in 1864. This college was offering courses at three levels viz., (i) engineer class, (ii) upper subordinate class, (iii) lower subordinate class. Standard of education in the college was of very high order, as such demand of engineers produced by this college was also very high [Subbarayappa, pp. 553-4]

The period also saw the commencement of agricultural education in the country as the Agricultural School in Saidapet was founded in 1876 [Singh, p21].

Veterinary education also made a debut during the period, and "The first school which was instituted was the Army Veterinary School at Poona



in the year 1862 at the suggestion of Staff Veterinary Surgeon J. H. B. Hallen, Principal Veterinary Surgeon of Bombay Presidency" [*Annual Administration Report, Civil Veterinary Department, India, 1892/93*, pp.39-44]. There were also recommendations for the establishment of veterinary schools in other places of the country. For example "The Cattle Plague Commissioners of India advised the Government of India during 1869-71 for the establishment of a veterinary college at Calcutta. Due to various reasons the establishment of the college was delayed. In 1863, Mr. J. H. B. Hallen, Principal Veterinary Surgeon, Bombay Presidency, and Superintendent of Army Veterinary School, Poona suggested to the Government of Bombay to establish a veterinary college and hospital in Bombay. This suggestion also gathered dust till 1886

How the professional education was spreading in India can be gauged from the fact that the number of professional colleges jumped from 8 in 1860/61 to 2126 in 1870/71 [Subbarayappa, pp553-4]. It is also to be noted that in 1885/86, 104 students qualified in medicine and 23 students graduated in engineering [Das, p189].

### **Scientific Organisations and Institutions**

The notable organisations and institutions that appeared during the period are Archaeological Survey of India (1861); Indian Museum (1866); Government Experimental Farm at Sydapet (1869?) and Model Farm at Kanpur (1874); and Marine Survey of India (1874). A short description of each of these institutes is given below.

#### **Archaeological Survey of India**

The appointment of Archaeological Surveyor to the Government of India was notified in the Minute by the Right Hon'ble the Governor General of India in Council on the Antiquities of Upper India dated 22nd January 1862 [Cunningham - 1]. A. Cunningham was the first Archaeological Surveyor to the Government of India. From this it is not very clear whether the Survey was established in 1861 or 1862. However, the following statement by A. Cunningham "In November 1861, I began my explorations as Archaeological Surveyor to the Government of India"[Cunningham - 2, p.xii]. makes it clear that the Survey was established in 1861. Moreover,

the first Report of the Archaeological Survey of India is dated 1861. Hence, the date of starting of the Survey given by Prashad [p. xix] as 1862 stands incorrect. Following its establishment, the survey was undertaken for the entire country by Cunningham and his colleagues J. D. Beglor and afterwards by A. C. L. Carlile as well, which resulted in a spate of publications in the form of reports. The activities of the Survey was curtailed in 1889 and revived in 1902 [Prashad, p. xix]. Activities of other Surveys like Great Trigonometrical Survey, Topographical Survey, Geological Survey continued.

### **Indian Museum**

In 1856, the government collection lying with the Asiatic Society of Bengal in the Museum of Economic Geology was shifted to Geological Survey of India. However, the archaeological and zoological collection continued to grow. Between 1856 and 1858 the Society negotiated with the government for the transfer of its own museum collection to a public museum under certain terms. Through the persuasive efforts of the Society, Indian Museum Act (Act No, XVII of 1866) came into being in March 1866. Barnes Peacock, the then Chief Justice of Bengal became the President of the Trustee. John Anderson, ex-Professor of Natural Science in Free Church College at Edinburgh, became the first curator of New Museum in Sept. 1866. The Society handed over its rich collection of geological, archaeological and zoological objects to the Board of Trustees. The present building of the Museum became ready for occupation in 1875 and on 1st April 1878, the Museum was thrown open to the public [Subbarayappa, 529-30].

### **Government Agricultural Farm, Sydapet**

The Farm established most probably around 1869 is one of the earliest agricultural farms of the country. Model Farm at Kanpur established in 1874 was yet another step taken towards systematic agricultural research.

### **Indian Marine Survey**

Indian Navy since its inception in 1832 continued hydrographic work and marine survey as its secondary duty till 1862. There was no marine

survey till 1874 due to the abolition of Indian Navy. In 1874 the Indian Marine Survey was established, and in 1875 emerged the Indian Coastal Survey [Prashad, p.xvii]

## Hospitals

Apart from these institutions, hospitals like Madras Lying-in Hospital; Military Lock Hospitals, Madras; Madras Government Maternity Hospital; and Tejpur Lunatic Asylum, were established most probably around mid-1870s. Many charitable institutions and dispensaries were also set up during the period.

## Other Organizations

Unlike Madras and Bombay, Calcutta was not having any independent observatory for long. Of course, the Meteorological Reporter to the Government of Bengal used to function from Surveyor General's Office at Calcutta . The plan for the establishment of an observatory at Calcutta by the Government came up much later and finally in 1875, the Alipore Observatory was established [Fermor, 20]. Another important organisation that was set up during this period is the Botanic Garden at Lucknow in 1876 [Jain, p.161]

Societies, associations, etc that appeared during the period were mostly related to medicine, and others to agriculture and horticulture, photography, archaeology and science. Of course, the most important of these is the Indian Association for the Cultivation of Science.

Of the medical societies that appeared during the period, **Madras Medical Book Society** (1860) figures first, followed by others. The society most probably patterned after similar societies or book clubs in England built up a sizable collection of books for the use of its members and donated a valuable collection of 1200 scientific books to Madras Medical College Library [Neelameghan, p.36].

**Bengal Branch of the British Medical Association** founded in 1863 started publishing *Journal, Bengal Branch, British Medical Association* from

1865, which possibly did not survive beyond its first volume. Following the reading of a paper on homeopathy by Dr. Mahendra Lal Sircar in one its meeting, a controversy arose, which led the Branch to grief and finally to its closure [Neelameghan, pp.42-3].

**Madras Apothecaries' Society** founded in 1864, survived till 1871. The members of the Society mostly comprised Warrant Medical Officers. Reading of original essays, discussions on professional subjects, lectures and discourses, exhibitions, etc used to be the activities of the Society [Neelameghan, pp.63-64].

**Punjab Medical Mission Society** seems to have been established around 1870. From its annual report it appears that the Society continued till 1880s or beyond. Possibly, the Kashmir Hospital, Biluch Hospital etc were run by the Society.

**Agri-Horticultural Society of Oudh** established in 1861 possibly on the pattern of other agri-horticultural societies existed at that time in India. It did not seem to have brought out any publication except its Annual Report..

It is not known when exactly **Bengal Photographic Society** was established. However, from its journal that existed during 1862 to 1971, the period of existence of the Society can be inferred. No other information about the Society could be gathered.

**Indian Engineers Association**, which most probably was established around 1870, did not survive long. However, it brought out the volume of its *Transactions*. From its *Transactions*, which appeared in 1875, it seems that **Archaeological Society of Agra** existed in 1870s.

**Indian Association for Cultivation of Science**, existing to date has been one of the foremost scientific associations in the country, with which were attached such famous scientific luminaries of the country as C. V. Raman, Meghnad Saha, K. S. Krishnan, and S.N. Bose. All these people helped directly or indirectly in the founding and growth of scientific periodicals in India.

The idea of establishing a research institution with library and laboratory facilities was first mooted by Dr Mahendra Lal Sircar, an eminent

physician of Calcutta in a memorable article published in 1869 . In that article Dr Sircar wrote:

“We want an Institution which will combine the character, the scope and objects of the Royal Institution of London and of the British Association for the Advancement of Science. We want an Institution which shall be for the instruction of the masses, where lectures on scientific subjects will be systematically delivered and not only illustrative experiments performed by the lecturers, but the audience should be invited and taught to perform them themselves. And we wish that the Institution be entirely under native management and control...” [Sircar].

Dr Sircar’s aforesaid article aroused considerable interest among the enlightened public about the Institution, and he published the following prospectus for the Institution in the *Hindoo Patriot* of 3rd January, 1870.

“1. The cultivation of Sciences by the Natives of India being deemed particularly desirable, it is proposed to establish in Calcutta an Institution for the purpose, to be called the Indian Association for the Cultivation of Science. This is to be the parent Institution branches will be established in different parts of India according as time, necessity, and other circumstances will suggest.

“2. The object of the Association will be, as its name indicates, to invite, encourage and enable the Natives of India to cultivate science in all its departments. A correlative object will be to rescue from oblivion whatever is connected with India, ancient or modern. Thus the Association will aim at editing and publishing the ancient records, so replete with interest and wisdom.

“3. The chief requisites to the formation of the Association being a local habitation, scientific works and instruments, and men able and willing to work, it is proposed to purchase a piece of land in Calcutta and to build a suitable house thereon; to purchase scientific instruments and standard works on the various branches of science; and to invite to join the Association men who are either already prosecuting their studies in especial departments, or who are just out from our educational institutions ambitious, but unable from want of means, to prosecute scientific studies.

“For such and all these purposes money is the one thing needful. All well-wishers of Progress and of India are therefore solicited to contribute their quota in furtherance of the project which has been so feebly and imperfectly set forth”.

Sir Richard Temple, Lieutenant - Governor of Bengal very actively supported the efforts. Through six years of continuous hard work, Dr Sircar overcame the opposition, collected a few lac of rupees from prominent citizens of Calcutta and also others like Maharaja of Vizianagram, who alone contributed Rs 50,000/-, and finally occasioned the birth of the Association in July 1876 [Sen].

### **Government Departments**

Government departments like forestry and public works, which were initially established in presidencies gradually started to be established in provinces. Numerous new departments as well as offices also appeared during the period. All these departments and offices started bringing out the periodic reports of their variegated activities, which doubtless added a new dimension to the growth of scientific literature. In the following paragraphs a glimpse of the development is being provided.

### **Chemical Examiners Department**

The earliest Chemical Examiner's Department was established in Madras. In 1860s North-Western Provinces and in 1870s Bombay, Sind, Punjab, Bengal and Mysore also started the department for carrying out chemical analysis of various items.

### **Assay Department**

The first Assay Department, encountered in this study, was that of Madras, which seemed to have been established in early 1870s.

### **Marine Department**

The Department came into existence in 1858 and remained with the central government till 1906/07. No presidency or province started such a

department. While Indian Navy, afterwards Marine Survey and Coastal Survey undertook the responsibility of marine and coastal survey, this Department dealt with other marine affairs.

### **India Meteorological Department**

Though meteorological, magnetic, seismological and astronomical data were being collected at various observatories located at different parts of the country, there was practically no coordination. Hence, the Department was established in 1875 with H. F. Blanford as the Meteorological Reporter to coordinate, combine and extend the work of various meteorological organisations of the country. These functions of the Department included among others experimental observations, compilation of daily weather charts, issuing of weather summaries, and conducting of solar, physical, seismological and terrestrial magnetic studies. This Department has been responsible for the birth of a number of periodicals on various branches of meteorology in the 19<sup>th</sup> and 20<sup>th</sup> centuries..[Subbarayappa, p. 503, Rajagopalan, p.221, Hundred Years of Weather Service, pp. 24 - 28]

### **Offices of Sanitary Commissions, Medical Establishments, etc.**

The establishment of the Offices of Sanitary Commission for India and three presidencies, i.e. Bengal, Bombay and Madras, and Conservancy Department in Calcutta around 1863/64 as mentioned earlier was a new development. These offices made attempts to survey comprehensively the health and sanitary conditions prevailing in the respective areas and compile reports. These were the first steps to provide at least a rough idea about the health and sanitation condition of the country based on statistics. Similar offices also appeared in Punjab, North-Western Provinces, Central Provinces, Oudh, Hyderabad Assign Districts, and Assam in 1860s and 1870s. [Prashad, p. xviii].

Besides offices of the sanitary commissions also appeared medical departments, offices of the inspector general of dispensaries, health officers, etc in presidencies, provinces, and metropolis in quick succession to take care of the activities of the civil hospitals, charitable institutions, dispensaries, and so on. These offices appeared more or less in the following chronological order: Central Provinces, North-Western Provinces, Calcutta

metropolis, Punjab, Madras, Bombay, Oudh, Bengal, Hyderabad Assigned Districts all in 1860s; Rajputana, Coorg, Malwa all in 1870s. These departments/offices also took care of health aspects of native army, military lock hospitals, lying-in hospitals and so on.

Vaccination operations which started in Bombay and Madras in 1850s, gradually spread to other presidencies and provinces like Central Provinces, Bengal, Punjab, North-Western Provinces and Oudh in 1860s, and Hyderabad Assigned Districts in early 1870s.

Lunatic asylums which appeared in Bengal in mid-1850s, spread to Punjab in mid-1860s and Bombay, Madras, Central Provinces and Assam during 1870s.

### **Public Works Departments**

Public works departments first started in Madras Presidency around 1850. Thereafter, it started to appear in other places including the centre. During the period of 1858 to 1876, these departments also appeared in Bengal, Coorg, Mysore, North-Western Provinces, all in 1860s; Rajputana, Hyderabad Assigned Districts, Andaman and Nicobar Islands, Central India Agency and Assam in 1870s. The extension of railways and telegraph continued unabated [*Encyclopaedia Britannica*, p.187]. The construction of canals etc for irrigation purposes started along with public works possibly first in Bombay and thereafter Bengal in 1860s and followed by such places as Mysore, and Madras in 1870s.

### **Department of Land Records and Agriculture**

This is also a new department established for the first time in the country in the province of Sind. From its first annual report dated 1872/73, it can be safely assumed that the Department was established in 1872. No other presidency, province or state had this department before 1876.

### **Cinchona Department**

The cultivation of cinchona began in India in the year 1860 under the auspices of the government through the efforts of Sir Clements Markham,



more or less simultaneously at Darjeeling and Nilgiri Hills[Jain, p161]. A new department, called Cinchona Department, was established under the auspices of the Madras government in 1860.

### **Cotton Department**

Prior to independence, India was the second largest exporter of cotton, next only to US [*Encyclopaedia Britannica*, p.186]. From this itself it can be imagined the amount of importance, the British laid on cotton. From this study, it appears that the Cotton Department was established first under the auspices of Central Provinces around mid-1860s. Gradually the departments appears to have started in other provinces/presidencies like North-Western Provinces (mid-1860s), Punjab and Bombay in early 1870s and Hyderabad Assigned Districts in mid-1870s.

### **Poppy Cultivation**

Poppy cultivation was attempted at the Experimental Poppy Gardens at Deegah and Meetapore around 1875 [*Annual Report*].

### **Forestry Departments/Offices**

The departments of forestry which started appearing from 1830s spread over to several other presidencies/provinces like Sind and Madras in 1850s; Oudh, Central Provinces, Mysore, North-Western Provinces, Lower Provinces and Coorg in 1860s; Hyderabad Assigned District, Ajmer-Merwara, Assam and Punjab in 1870s.

In 1865 Indian Forest Act (Act VII of 1865) was passed to stop destruction of forests by timber cutters, charcoal burners and also through shifting cultivation [Prashad, p. xvii]

### **Fisheries**

The post of Inspector General of Fisheries was created in 1870 and F Day appointed to the post. It is, however, surprising that no fisheries department was encountered in this study till 1900. [Prashad, p. xviii].

## Periodicals

All the developments encompassing the spread of education, establishment of the Archaeological Survey of India, Marine Survey, Indian Museum, Agricultural Farm at Sydapet, offices of sanitary commissioners, hospitals, dispensaries, sanatoria, lunatic asylums, societies and associations, various government departments, directly and indirectly led to the birth and development of periodicals.

Table 5 depicts the distribution of periodicals according to types during 1858 to 1876. Each year during this period has given birth to one or more periodicals. The minimum being just one in 1859 and maximum being 21 in 1876. As many as 130 (64%) periodicals are found to be reports, followed by journals (48) and other types. The number of proceedings and similar publications is just 8, and that of data periodicals 9. The remaining 4 periodicals comprise memorandum, reviews of work, accounts of works, and returns.

## Journals

Of the 48 journals recorded here, 23 (48%) are in English, 16(33%) in Bengali, 4 in Portuguese, 2 in Urdu, 2 in Marathi and one in Gujarati. English journals of the period were devoted to geology (1), meteorology (1), palaeontology (1), archaeology (2), ornithology (1), medicine (6), engineering (6), agriculture (3), forestry (1), and photography (1).

### English Journals

Some of the important journals of the period are: *Records of the Geological Survey of India* (1868), the only journal devoted to geology that came out during the period. It was brought out to publish short contributions as opposed to *Memoirs of the Geological Survey of India* which was to carry comprehensive contributions. The journal has been carrying the *Annual Report of the Geological Survey of India* from the very beginning. It continues till date and is one of the longest surviving journal on geology.

**Table 5-Growth of Indian Scientific Periodicals  
(according to types) during 1858 - 1876**

Year	Journal	Report	Proceedings Records Minutes, etc.	Data Periodicals	Others	Total
1858	1	3				4
1859	1					1
1860	4	3				7
1861	1	8	1			10
1862	2	4		1		7
1863	2	2		1		5
1864	1	5				6
1865	3	6	3			12
1866	2	6	2			10
1867	1	11				12
1868	4	6	1	3	1	15
1869	3	7			1	11
1870	2	7	1		3	13
1871	5	12		1		18
1872	4	9		1		14
1873	3	8				11
1874	1	13		1		15
1875	3	5				8
1876	5	15		1		21
<b>Total</b>	<b>48</b>	<b>130</b>	<b>8</b>	<b>9</b>	<b>5</b>	<b>200</b>

Periodicals on meteorology has been coming out in India since 1796. However, there was no learned journal on the subject till the appearance of *Indian Meteorological Memoirs (1876)*. The periodical brought out under the direction of H.F. Blanford, the first Imperial Meteorological Reporter to the Government of India, was the first learned journal on the subject.

*Memoirs of the Geological Survey of India- Palaeontologia Indica being Figures and Descriptions of the Organic Remains procured during the Progress of the Survey (1861)* is the sole journal on palaeontology published from India so far.

*Indian Antiquary* (1872), a noted journal on Indology was partially devoted to archaeology.

India has been a safe haven for a very large species of birds all along. Unfortunately, the land has not given birth to many good journals on ornithology. *Stray Feathers: a Journal of Ornithology for India and its Dependencies*. (1872) stands as a sole example of a learned journal on the subject in the 19<sup>th</sup> century. Even 20<sup>th</sup> century lacked such a periodical on birds from India.

Of the medical journals that started during the period *Indian Lancet* (1859); and *Journal, Bengal Branch, British Medical Association* (1865) were short-lived. *Madras Quarterly Journal of Medical Science*(1860) and *Transactions of the Grant College Medical Society* (1865) , *Bombay* both continued for long and carried important contributions. *Indian Medical Gazette* (1866) was the best Indian medical journal of the 19<sup>th</sup> century and mirrored the Indian medical scene holistically from its very inception. It may be noted here that the journal carried the Nobel Prize winning articles of Ronald Ross in the September, November, and December issues of 1898 and January issue of 1899. No other Indian scientific journal seems to have ever carried any other Nobel Prize winning paper. *Calcutta Journal of Medicine* (1868) was started by Mahendra Lal Sircar, the founder of the Indian Association for the Cultivation of Science. It is this journal which carried the article mooted the idea of the establishment of the Indian Association for the Cultivation of Science. It published article on all areas of medicine and included information on conferences, book reviews, and so on.

Prior to this period, journals on engineering as such were absent. This period filled that gap with the emergence of the following journals: *Engineer's Journal and Railway Chronicle of India and the Colonies* (1858); *Madras Civil Engineering College Papers* (1860); *Professional Papers on Indian Engineering*. (1863); *Bombay Builder* (1865); *Transactions, Indian Engineers Association*. (1872); and *Indian Telegraphic Journal* (1875). *Engineer's Journal and Railway Chronicle of India and the Colonies* is the first engineering journal to be published from India and it probably was the best journal on engineering in the 19<sup>th</sup> century published from India. The journal completed one hundred years of its existence in 1958 and is still going strong.. On the

other hand *Professional Papers on Indian Engineering*, a publication of the Thomason Civil Engineering College, Roorke existed for about 24 years and published many papers on various branches of engineering. *Bombay Builder*, *Madras Civil Engineering College Papers*, and *Transactions, Indian Engineers Association* were all short-lived journals *Indian Telegraphic Journal* was in fact devoted to electrical engineering and ushered in the publication of a journal on that subject in India.

Three agricultural journals of the period are: *Agricultural Gazette of India* (1869); *Indian Economist and Indian Agriculturist* (1870); and *Indian Agriculturist* (1876). Of the three journals, the first two were short-lived. *Indian Agriculturist*, a publication of *The Statesman* office, Calcutta on the other hand continued for 40 years and was a popular journal on the subject.

The first journal on forestry, *Indian Forester* (1875) also appeared during this period. Both in 19<sup>th</sup> and 20<sup>th</sup> century this journal continued to be the foremost journal on forestry from India.

This period also saw the appearance of a photographic journal, i.e. *Journal, Bengal Photographic Society* (1862). Compared to its predecessors, it survived longer, for about 10 years.

### Other Journals

The period saw the emergence of four **Portuguese** journals, all devoted to medicine. Sixteen popular **Bengali** scientific periodicals [vide Language Index] also appeared during the period. Of these, seven were devoted to science in general; eight to medicine, and one to agriculture and industry. Of the remaining five periodicals, two were in **Marathi** and devoted to agriculture and engineering respectively, two were in **Urdu** and dealt with science in general and medicine, one was in **Gujarati** and devoted to agriculture [vide Language Index].

### Reports

The number of periodic reports that appeared during 1858 to 1876 is quite large and touched almost all areas of science. The subject-wise breakdown of the reports were as follows:

### Science in General

In this category one only report, i.e. the *Report of the Indian Association for the Cultivation of Science* appeared.

### Surveys

The survey reports encountered during this period number five and they belong to Topographical Survey of India (1860), Revenue Survey, Upper and Lower Circle (1861), Great Trigonometrical Survey of India (1862), Survey and Settlement Operation, Hyderabad Assigned Districts (1874), and Marine Survey of India (1874).

### Chemical Examination

*Reports on the Analysis of Potable Water of Cantonments* (1866) seems to be the first report of its type from India. Chemical Examiner's Department continued to be established in various provinces and their activities generated reports of the following provinces: North-Western Provinces (1868), Madras (1871), Bombay and Sind (1871), Punjab (1873), and Calcutta (1875). In 1870s, Assay Department was established in Madras, and its report started in 1872.

### Observatories

Various data periodicals were being issued by Observatories at Madras and Colaba since long. The reports of these Observatories, however, started emanating from 1860 and 1865 respectively. Meteorological observatories were established in a few more provinces which resulted reports of observation from Punjab (1867), Bengal (1867), North-Western Provinces (1870), and Oudh (1870). The Meteorological Department of India was established in 1875. Its report, report on meteorology on all India basis, and the report of Meteorological Department of Western India, all originated in the same year.

### Hydrology

Not many activities are observed in respect of hydrology in 19<sup>th</sup> century. Some activities that started are reflected in the report of Marine Department, India (1858), and report on Calcutta and Eastern Canals and Nuddia Rivers (1868).

### **Archaeology**

Archaeological Survey of India started publishing one report in 1861 and others in 1874. Unlike other reports, these included lengthy articles on archaeological surveys.

### **Botanical Gardens**

Reports of Government Botanical Gardens, Saharanpur and Mussorie started in 1861 and those of Royal Dover Garden, Port Blair and Government Botanical Gardens and Parks, Madras probably in 1871.

### **Medicine**

Largest number of reports of the period pertain to the field of medicine. Reports of charitable dispensaries and hospitals started appearing from many provinces and cities that included Central Provinces (1862), Calcutta (1865), North-Western Provinces (1865), Punjab (1865), Madras (1866), Oudh (1869), Bengal (1870), Hyderabad Assigned Districts (1871), Rajputana (1872), Bombay (1873), and Malwa (1874).

Reports of the Sanitary Commission of Bengal, Bombay, Madras and India all started together in 1864. Similar reports started coming from several other provinces afterwards - Punjab (1867), North-Western Provinces (1868), and Central Provinces (1868). Reports of the Sanitary Department, Calcutta (1864), Health Officer, Bombay (1866'), Medical Department, Coorg (1873); Sanitary Reports of Oudh (1868), Hyderabad Assigned Districts (1870), and of Assam (1876); Medical and Sanitary Report of Native Army of Madras (1868'), Bengal (1869'), and Sanitary Report of British Troops, Madras (1876) - all originated during this period.

Reports on Lock Hospitals started appearing from 1870s, which saw the emergence of the reports of Lock Hospitals, North-Western Provinces (1874), Madras (1876'), and Central Provinces (1876).

The first reports of a Lying-in Hospital as well as of a Maternity Hospital go to the credit of the hospitals at Madras which appeared in 1876. Reports of Lahore Medical School and Hospital, Punjab Medical Mission Society, and Nagpur School of Medicine seem to have started in 1867, 1870 and 1874 respectively.

How the vaccination activity spread in different provinces can be seen from the dates of the starting of the Reports on Vaccination which are as follows: Central Provinces (1866), Punjab (1867), Bengal (1867), Oudh (1869), Rajputana (1872) and Hyderabad Assigned Districts (1872). Like vaccination activity, also spread the establishment of lunatic asylums in different provinces. The reports of these asylums started appearing from different provinces in the following order- Punjab (1867), Oudh (1868), Bombay (1873), Madras (1873), and Central Provinces (1874). The report of Tejpur Lunatic Asylum started in 1876.

### Engineering

Report of the Thomason Engineering College (1863) is the only report devoted to engineering in general. Other reports pertained to Public Works Departments of various provinces which started in the following order: Bengal (1860), Coorg (1862), Bombay (1865), Mysore (1866), North-Western Provinces (1867), Rajputana (1871), Hyderabad Assigned Districts (1871), Andaman and Nicobar Islands (1871), Central India Agencies (1872), and Assam (1874). Reports of Building and Roads Branch, Public Works Department, Bengal started in 1871 and that of Mysore in 1872.

### Agriculture

Reports on agriculture in general pertained to the Agricultural and Horticultural Society of Oudh (1861), and that of Western India (1863). The report of Land Revenue Administration of Central Provinces started in 1861. The *Annual Report of the Department of Land Records and Agriculture, Sind* started in 1872 seems to be the first report related to a department on agriculture. The British Government started establishing experimental farms from late 1960s. The period under consideration witnessed the emergence of the reports of Government Agricultural Farm, Sydapet (1869), Madras Experimental and Model Farm (1871), Model Farm at Cawnpore (1874), and Experimental Poppy Garden at Deegah and Meetapore (1875). Reports on irrigation appeared from Bengal in 1869, Mysore (1872), Bombay (1876) and Madras (1876). Reports on cinchona cultivation appeared in 1861, cotton cultivation in Central Provinces in 1867 followed by Punjab (1871), and Bombay (1873). Report on tea cultivation in Assam appeared in 1873 and poppy cultivation in India probably in 1876.



### **Forestry**

Reports on forest administration, management, conservancy, etc of various provinces appeared in the following order: Sind (1858), Madras (1858), Oudh (1861), Central Provinces (1862), Mysore (1865), North-Western Provinces (1866), Lower Provinces (1867), Hyderabad Assigned Districts (1870), Ajmer-Merwara (1872), Assam (1874), and Punjab (1876). In addition, Report of Forest Survey of India came out in 1872 and that of Forest Conference in 1873.

### ***Proceedings etc***

The proceedings, minutes, etc that started appearing during the period belonged to Agricultural and Horticultural Society, Madras (1861); Asiatic Society of Bengal (1865); Government Observatory, Colaba (1865); Public Works Department, India (1865); Indian Museum (1868); Bombay Government -Irrigation (1866); Medical Department, India (1868); and Irrigation Branch, Bengal (1870).

### ***Data Periodicals***

The data periodicals that started publishing during this period belonged to observations of the fixed stars (1862); meteorological observations (1863, 1868, 1872, 1876); tidal tables (1871); vital statistics (1871); weather and crop reports (1874). The practice of the crop estimation was first encountered in 1868, when *Area and Estimated Outturn of Cotton crops, North-Western Provinces* was brought out.

### ***Other Periodicals***

The periodicals belonging to other categories that started in this period were in the form of memorandum (1868), review (1869); account of the operations (1870); historical sketch (1870); and returns (1870).

### **Subject-wise Distribution**

Table 6 provides the subject distribution of periodicals wherefrom it can be seen that medical periodicals numbering 72 tops the list, followed by periodicals on agriculture and forestry (47); engineering -mainly civil (22); meteorology (15); science in general (11); surveying (8); chemistry (7);

archaeology 5; geology, botany and irrigation - three each; astronomy (2); palaeontology, zoology, photography, and museology - one each. Comparing Table 4 with Table 6 it is found that geomagnetism and geography have disappeared in Table 6, and chemistry and irrigation have entered there in a convincing way.

Table 6 - Growth of Indian Scientific Periodicals (according to subjects) during 1858 - 1876

Year	Sci	Surv	Chem	Geol	Met	Arch	Bot	Zool	Med	Engg	Agr	For	Oth.	Total
1858				1						1		2		4
1859									1					1
1860	1	1			1				2	2				7
1861		1				1	1				5	1	1	10
1862		1							2	1		1	2	7
1863					1				1	2	1			5
1864									6					6
1865	1				1				6	3		1		12
1866			1						5	1	1	1	1	10
1867	1				2				6	1	1	1		12
1868	1		1	2	1				7		2		1	15
1869	1	1							4		3	2		11
1870		1			2				6		2	2		13
1871	2	1	2				1		5	4	2	1		18
1872			1		1	1		1	3	3	3	1		14
1873	1		1						5	1	2	1		11
1874		2	1	1	1	3			3	1	2	1		15
1875	1				3				1	1	1	1		8
1876	2				2		1		9	1	5	1		21
<b>Total</b>	<b>11</b>	<b>8</b>	<b>7</b>	<b>4</b>	<b>15</b>	<b>5</b>	<b>3</b>	<b>1</b>	<b>72</b>	<b>22</b>	<b>30</b>	<b>17</b>	<b>5</b>	<b>200</b>

## **BACKGROUND & PUBLICATIONS OF SCIENTIFIC PERIODICALS (e) 1877-1900**

From the previous chapters it is evident that the East India Company and the British Government till late 1870s paid considerable attention to surveying, meteorology, public health, public works, and forestry and practically no attention to agriculture. The number of agricultural experiment stations numbered not even five and only one department of agriculture started under the Government of Sind early in 1870s. No arrangement was to take a stock of the food situation in the country. Neither, any mechanism was introduced to forecast the food production in the immediate future. Till 1879 there was no arrangement for imparting training in agriculture. In such a situation, the occurrence of famines was but a quite natural consequence.

The Deccan Famine of 1876-78 which affected most of southern and western India, took the lives of 45 lakh people (unofficial figure goes to 66 lakh) and very badly affected another 4 crore. The unimaginable dimension of the famine overwhelmed the Government of India. The abject poverty of the peasants perpetrated by the inhuman exploitation by moneylenders and landlords with no action from the Government to remove the bane led to a large scale rioting, murder of landlords and moneylenders and attacks on British officials. This woke up the Government from its slumber and forced it to appoint the Famine Commission under Sir Richard Strachery [Dhar and Singh].

The Famine Commission recommended for the establishments of agricultural departments in each presidency or province for the collection of data, famine prevention, famine relief, experimentation in agriculture. The Commission also recommended a definite programme of irrigation with the aim of extending the existing 2.9 crore acres of irrigated land, which represented a small portion of all cultivated land; and a 50% rise in the 1.07 crore acres under canals to 1.53 crore acres by 1895 [Dhar and Singh].

The Commission was highly far-sighted and its recommendations had far reaching influences on agriculture, meteorology, and so on. This phase in Indian history undeniably laid the foundation not only of agricultural research but also of agricultural periodicals. The number of periodicals on

agriculture shot up from mere 30 during 1858-1875 to whopping 139 during 1876-1900.

It is intended to give a brief account in the in the forthcoming pages of the developments occasioned by the recommendations of the Commission and various other factors till 1900, the last year of the nineteenth century, which in its later part saw the dawn of the decisive struggle for India's independence.

### **Educational Development**

The development of medical, engineering and other professional education continued during the period under the aegis of the three premier universities. Two more universities - the University of Punjab and the University of Allahabad were established in 1882 and 1887 respectively. The progress of professional education can be judged from the fact that the number of professional colleges rose from 18 in 1881/82 to 37 in 1891/92 and the students from 1,545 to 3,292 in the corresponding years [Subbarayappa, p.548]

#### **Medical Education**

The medical colleges/schools established earlier, continued to flourish. Several new colleges/schools also appeared at Indore (1878), Tanjore (1883), Ludhiana (1894), and Dibrugarh (1900) [Subbarayappa, p.548]

#### **Engineering Education**

Engineering colleges established before continued to impart training. New industrial schools or similar institutions were also set up. For example, in Madras, there were six industrial schools in 1885 - three in Madras, and three in the mofussil areas [Subbarayappa, p.558] The Bihar College of Engineering also came into existence in 1896 through the generous donation of Nawab Syed Khan, a landlord of Patna district [Das, pp.185- 204]. Victoria Jubilee Technical Institute started at Bombay in 1887 with two departments- the Sir J J School of Mechanical Engineering and the Ripan Textile School at Byculla [Rajagopalan, p. 859].

By the end of the century there were twelve engineering institutions, turning out qualified engineers for constructing roads, buildings, canals

and so on. Several technical schools were also producing trained craftsmen. Calcutta School of Arts were also offering training to a sizable number of students every year. In 1886, as many as 157 students were undergoing training in the school. Other schools that were functioning were industrial schools, one each at Gorakhpur and Banaras, a survey school at Calcutta (f.1896), and an engineering school (f.1896) at Bankipur in Bihar [Subbarayappa, p.558]

### **Agricultural Education**

Agricultural education did not receive much importance till the last decade of the nineteenth century. Before that the Engineering College at Poona added an agricultural wing in 1879, and the agricultural farm at Madras had a school of agriculture attached to it from 1886. *Indian Forester* reported in 1885 that Madras government had an agricultural college possibly referring to the school just mentioned. The recurrence of ravaging famines decades after decades, extremely low productivity of Indian farming, loss of crops by pest attacks, etc occasioned the dawning of the idea of ushering in agricultural education in the country, which first of all found eloquence in the Agricultural Conference held in 1888. In the following year J. A. Voelcker of the British Royal Agricultural Society made several suggestions to improve agricultural education and practices in India. As a result, the agricultural schools at Coimbatore, Nagpur and Kanpur were established at the fag end of the nineteenth century. During this time Sibpore Engineering College added an agricultural wing, and Madras Agricultural School turned into a college [Subbarayappa, p.550]. Regarding Nagpur Agricultural School (f.1988), *Agricultural Ledger* writes, the School "established as a part of the Chief Commission's Scheme for Technical Education... had since continued to work satisfactorily"

### **Forestry Education**

Forestry attracted the attention of East India Company ever since it came into power. That the Crown paid no less attention to the subject becomes evident from the fact that in very quick succession forestry departments emerged in various presidencies, provinces and states after 1858. To manage the affairs of forests, occupying a huge area in the country, manpower was needed. Importing of trained manpower from Great Britain

for all superior posts possibly was a costly proposition, and not easy. Hence, the question of training the natives for the appointments in superior posts engaged the attention of the Government of India in 1869 [Circular -1]. "The plan of establishing a separate institution for the aforesaid purpose was first sketched by Sir Richard Temple, then Lt. Governor of Bengal, in a minute dated 9th October 1876" [*Indian Forester* 7]. The Government of India took necessary action in the matter and the Indian Forest School at Dehra Dun came into being in 1878 [Circular-2]. The date for the opening of the school was fixed as the 1st June 1879 [*Indian Forester* 7]. The school was designated as Imperial Forest College in 1884 [Rajagopalan, p. 216]. As the oldest and foremost college of forestry education, it exists till date with the name Forest Research Institute and Colleges. Another School of Forestry started in Poona at the fag end of the century [*Indian Forester* 26].

### **Veterinary Education**

During the period several veterinary schools were started in the country. The history of establishment of the schools is as follows. Hapur School was proposed and organised by Inspecting Veterinary Surgeon J. H. B. Hallen, the General Superintendent, Horse Breeding Operations, in the year 1877 for the purpose of educating men for the position of salutrists and castrators in the horse and mule breeding districts of Northern India. The School was closed on the inauguration of Lahore Veterinary School in 1882. It is again on the suggestion of Hallen, the Vernacular School at Lahore was established in 1881 with Inspecting Veterinary Surgeon G Kettlewell as its first Principal, who joined the School on 23rd December 1881. The classes, however, started in March 1882 on the transfer of students from Hapur. It has been noticed in the previous chapter that no action was taken on the suggestion made by Mr. J. H. B. Hallen in 1863 for the establishment of a veterinary college and hospital in Bombay till 1886. In 1886 Mr. W Lamb, Principal Veterinary Surgeon, Bombay, urged upon the government to establish the school, and it was done. Prof. J. H. Steel joined as the first Principal of the College on 25th May 1886. The lecture rooms, resident office quarters, and Patho-Bacteriological Laboratory were the gifts from Sir Dinshaw Maneckji Petit., Bart. [*Annual Administration Report, Civil Veterinary Department, India, 1892/93, pp39-44*].

The Veterinary College at Calcutta which could not be established till early 1890s despite the recommendation of the Cattle Plague Commission of India made during 1869-71, came into existence around 1894, through the generous grants of two benevolent individuals. In 1891 Babu Sheoi Baksh Bagla 'very generously subscribed and paid to government Rs.30,000/- in aid of the project, and also offered 7-1/4 bighas of land for the site. On the other hand, Sir Dinshaw Maneckjee Petit, Bart. of Bombay also donated Rs.25,000/- for the establishment of the hospital. In order to properly honour the donor, the Lt. Governor of Bengal sanctioned the naming of the institution as follows "that it should as a whole, be called the Bengal Veterinary Institution, and the parts thereof (1) 'The Kenneth McLeod Veterinary School'. Babu Shoe Baksh Bagla being anxious to commemorate in this way Dr. Kenneth McLeod's labour in the cause of veterinary science; an (2) 'The Sir Dinshaw Maneckjee Petit Veterinary Hospital. [*Annual Administration Report, Civil Veterinary Department, India, 1892/93, pp39-44*]. Possibly the School was opened by Veterinary Captain W D Gunn. During 1898/99, the Institution was raised to the status of a college, and it was named as Bengal Veterinary College [*Report, Department of Land Records and Agriculture, Bengal, 1899/1900, p.41*]

A proposal to establish a veterinary school at Ajmer was made by Col. G. H. Trevor, C. S. I., Agent to the Governor General in Rajputana and was supported by Mr Hallen in his letter no. 37 R and D dated 1st February 1891 to the Secretary to the Government of India, Revenue and Agriculture Department. The establishment of the veterinary school was accordingly sanctioned by the Government of India. The building of the School was commenced in April 1893, when the Principal also joined, and the School opened in 1894. [*Annual Administration Report, Civil Veterinary Department, India, 1893/94*].

Babugarh Instruction Farm was established under the order of the Government of India (Revenue and Agricultural Department Letter no. 1842-26, dated 11th August 1892) with a view to affording practical instruction in the following subjects:

- (a) The management of horse stocks in the stables, and the due care and farm working of stud horses and mares kept for breeding purposes.

- (b) The cultivation of forage crops of kinds suitable and early obtainable at a moderate cost for the feeding of horse stock [*Annual Administration Report, Civil Veterinary Department, India, 1893/94, p.55*].

It is worth noting here that the Government of India paid great attention towards horse breeding and not cattle breeding and dairy development in the 19<sup>th</sup> century. Why it is so is a matter of research. However, it can be reasoned that the horse was of great help to the British officers for travelling from one place to another at a time when motor cycles, scooters and cars were unheard of and rail lines were being laid to connect important Indian towns. Moreover, horses were sine qua non for the development of cavalry in India.

### **Scientific Organisations**

The number of important scientific organisations comprising museums, institutions, surveys, laboratories, observatories, botanical gardens, zoological gardens, hospitals, sanitarium, agricultural farms emerged during the period number about forty. Hence, they will be described in a classified order, and within each class chronological order will be followed. Museums dealing with a number of scientific subjects covering geology, paleontology, archaeology, anthropology, botany and zoology will be placed first, followed by other subjects.

#### **Museums**

The museums that came into existence during the period are Jeypore Economic and Industrial Museum (c.1880); and Lahore Central Museum (c.1890). All these museums brought out periodic publications in the form of report, bulletins, etc.

#### **Survey of India**

Great Trigonometrical Survey, Topographical Survey, and Revenue Survey which were functioning under the Surveyor General of India from 1817 were merged to form the Survey of India in 1878 [Prashad, p. xviii]. The activities of all the three surveys gave rise to periodic publications like reports etc.



### **Observatories**

Meteorology, which has always found favour with the East India Company as well as the Crown, received also a boost due to Famine Commission's recommendation. The number of observatories which were 103 in 1878, rose to 128 in 1885, exclusive of 22 observatories in Bengal. H. F. Blanford, the Meteorological Reporter to the Government, established one more observatory at Forest School, Dehra Dun [Subbarayappa, p.503]. Kodaikanal Observatory became functional in 1898 [Rajagopalan, p.223] and construction work of Solar Physics Laboratory began in 1899 [Subbarayappa, p.506] All these observatories carried out observations, and many of them brought out varieties of periodic publications.

### **Imperial Bacteriological Laboratory**

To combat diseases of stocks and to find out causes thereof Imperial Bacteriological Laboratory was established in Poona in 1890 under the Civil Veterinary Department. The services of Linard, a distinguished bacteriologist was secured to prosecute inquiries there. "Unfortunately, the premises at Poona were unsuitable, the site chosen was a bad one, and after two years experience, it was found that the climate did not allow of the finer operations of the science being carried out" [*Annual Administration Report, Civil Veterinary Department, India, 1892/93*, p51]. Because of this, the Laboratory was shifted to Mukteswar in 1893, to continue its normal functions.

### **Botanical Survey of India**

East India Company's Botanic Garden founded in Sibpore in 1787 provided immense help to researchers in botany. The need for coordinating the activities of the botanical departments in Bombay, North-West Frontier Provinces, Madras and Bengal, as well as for intensifying botanical exploration in the Western Himalayan region, the establishment of the Botanical Survey of India was thought of. Through the persuasive efforts of George King, the Survey came into being in 1890, with he became the as ex-officio Director [Subbarayappa, p.506]. The Survey also has given birth to a few periodic publications like the Annual Reports, Records, Bulletins, and *Annals of the Indian Botanic Garden*.

### **Botanical Gardens**

Several botanical gardens (including the one of His Highness the Maharaja of Oodeypur) came into existence in places like Poona, Oodeypur and Kumaon region. From their annual reports, it appears that the gardens were established in early 1880s.

### **Zoological Garden**

Only one zoological garden that has been encountered in the study is that of Calcutta which was established in 1878 through private efforts. It used to bring out annual reports.

### **Plague Research Laboratory**

In 1896, when plague broke out in an epidemic form in Bombay, a young Russian scientist, Waldemar Mordecai Wolff Haffkine was incidentally in India to try his anti-cholera vaccine. Haffkine was invited by the Government to investigate into the cause of plague epidemic and if possible to fight by developing a prophylactic vaccine against it. Haffkine, a brilliant student of Louis Pasteur, took up the challenge and laid the foundation of the Plague Research Laboratory in Bombay 1896. The scope of investigation was gradually expanded to cover various tropical diseases. From 1975, the Laboratory was befittingly renamed as Haffkine Institute in memory of its founder [Rajagopalan, p. 417].

### **King Institute of Preventive Medicine**

The Institute came into existence in 1899 through the initiative of Col. W. G. King, the then Sanitary Commissioner to the Government of Madras. The Vaccine Lymph Section of the Institute was opened in 1899 itself. Further expansion took place afterwards.

### **Pasteur Institute of India, Kasauli**

This is yet another important institute that was established in the last phase of the nineteenth century, and was responsible for, among others, the manufacturer of vaccines.

### **Hospitals, Asylums, Sanitaria**

During the period also came into existence general hospitals, special hospitals, asylums, and sanitaria. Some of them are: Mayo Hospital, Lahore;

Lister Hospital, Allahabad; Eden Sanitarium, Darjeeling; Lowis Jubilee Sanitarium, Darjeeling; Allahabad Eye Hospital; Government Maternity Hospital, Punjab; Junagarh State Hospital; Central Asylum, Lahore; and Kashmir State Leper Hospital. All these brought out annual reports.

### **Agricultural Experiment Stations**

Agricultural experiment stations, whose number was very few prior to 1880, started multiplying after the recommendations of the Famine Commission. All these experiment stations started conducting experiments with soil, fertilizer, method of cultivation, method of sowing, in fact, covered almost all areas of farming. Agricultural stations started till 1876 have already been discussed. During 1876 and 1880, one more agricultural farm, i.e. Nagpur Model Farm, existed. Some of the important agricultural stations that came into existence during 1880s are Government Farm, Hyderabad, Khandesh Agricultural Farm, Nagpur Experimental Farm. In 1890s Government Experimental Farm, Poona; Sibpore Experimental Farm; Surat Research Station were started. Many of these farms had their own publications.

### **Societies, Associations, etc.**

The number of important societies and associations founded during the period goes above thirty. A brief discussion about them follows.

**Bombay Natural History Society**, without any reservation can be termed as the foremost natural history society of the country. It was established in 1883, 'by a band of eight naturalists, of whom six were members of the British business community and two were Indians'. Its initial objective was to exchange notes and observations of zoology and exhibit interesting specimens of animal life. Later on, the scope of the Society was expanded to include botany [*Indian Forester* 78]. The Journal of the Society has again been the topmost journal in the field in India throughout its life now spanning more than one hundred years.

**Simla Natural History Society**. Practically nothing is known about the society except a reference occurring in the first volume of the *Journal of*

*the Bombay Natural History Society*, wherefrom it appears that it bought out a journal and existed during 1880s.

**Nilgiri Game and Fish Preservation Association** existed during 1890s, and published its annual report.

**Anthropological Society of Bombay**, existed during 1880s and brought out a journal.

**Microscopical Society**, was established in Calcutta most probably around 1880s. It brought out periodic publications like Annual Report, and Bulletin. Mr Wood-Mason was the President of the Society in 1888.

**Bombay Millowners Association**, and **Society for the Promotion of Indian Industries** are the two bodies devoted to the subject, the former established prior to 1881 existed for long, and brought out its Annual Report. The latter, existed in early 1890s also brought out a short-lived journal.

The largest number of associations and societies that emerged during the period are found to be on medicine. A brief description of them is given below.

**Dacca Medical Society** was established in December 1879 with civil hospital assistants attached to Mitford Hospital and local medical school. Local practitioners, promising students also joined the Society [*Indian Medical Gazette* 15]

**Calcutta Medical Society**. The first meeting of the Society was held at Calcutta Medical College, on 21st January 1880 at 8-30 p.m. and Dr. D B Smith, Principal, Calcutta Medical College was elected as the chairman [[*Indian Medical Gazette* 15, 50, 53]. The Society used to publish its *Transactions* till 1898, when it closed down. [Neelameghan, p. 24].

**Allahabad Medical Society** established in 1882 or slightly earlier brought out the first five issues of its *Proceedings*. It seems that afterwards the Society formed the North-Western Provinces and Oudh Branch of the British Medical Association. [Neelameghan, p. 43]

### **British Medical Association- Branches**

Several branches of the Association including the one stated above were started during the period. The **South Indian Branch** possibly started

in October 1883 with William Robert Cornish as the first President. The Branch survived long and brought out its *Transactions* from 1884 to 1924. [Neelameghan, pp.42-6].

Shirley Deakin organised the **Punjab Branch** around 1886 drawing the members of the defunct North-Western Provinces and Oudh Branch. The Branch came to a close with the death of Deaking in November 1889. [Neelameghan, pp.42-6].

Other branches that came into existence during 1880s and 1890s are **Bombay Branch** (1889), and **Hyderabad Branch** (1894) [Neelameghan, pp.42-6].

**Indian Medical Union** was formed in 1886 with a donation of Rs.10,000/- from Sir D. M. Petit, Bart. The union maintained a library, played a notable role in improving medical education and service, and brought out a short-lived periodical called *Bombay Medical Journal* [Neelameghan, p.34].

**Indian Medical Association** was formed in 1895 at Calcutta with Dr. L. M. Mukherji as the President, and Dr J. R. Wallace as the Secretary. The Association assumed the responsibility of bringing out the periodical called *Indian Medical Record* [Neelameghan, p.24].

**Medical Association of India**, formed around 1895 in Calcutta took over the publication of *Medical Reporter*, and started bringing it out under the title *Indian Lancet*. Nothing more is known about the Association [Neelameghan, p.26].

**Medical Missionary Association of India** started to bring out its *Quarterly Journal* from 1895. The Association was possibly formally established in 1905 [Neelameghan, p.47].

**Christian Medical Association of India, Burma and Ceylon** was founded in 1896 and brought out its *Journal* from 1926 [Neelameghan, p.48].

**National Association for Supplying Female Medical Aid to the Women of India** was formed in Calcutta in or around 1885 and continued till 1946. It regularly brought out its *Annual Report*.

**Health Society for Calcutta and Its Suburbs** is the only society devoted to public health encountered in this study. It was formed in Calcutta in 1885 and used to bring out its Journal which continued till 1888, when the Society wound up.

**Up-Country Nursing Association** and the **Punjab Nursing Association** are the two associations devoted to the subject that were encountered in the study. Both started around 1892. Most probably the Association did not bring out any periodic publication. [Neelameghan, p. 65].

**Bombay Veterinary Association** brought out its *Transactions* during 1890-92. From this it may be conjectured that the Association came into existence in or around 1890 and did not survive long.

**Engineering and Iron Trades Association of India** was established in 1895. In 1912, the name was changed to Indian Engineering Association. It has brought out several directories, and published a News Bulletin [Singh, p. 95]

### **Agri-Horticultural Societies**

Quite a few agri-horticultural societies was formed in and around 1880s. Some of the Societies are: **Agri-Horticultural Society of Nagpur**, **Punjab Agri-Horticultural Society**, etc. *Report, Department of Agriculture and Commerce, North-Western Provinces and Oudh, 1883/84* (p.15) states "A report received from **Bijnore Agricultural Society** during the year shows that it continues to take interest in its work. This society has since March 1884 started an agricultural journal which will prove no doubt useful in time. A new Agricultural Society has also been started at Aligarh". The aforesaid Report for the year 1884/85 (p.19) informs also about the foundation of North-Western Provinces Association.

### **Agricultural Students Association**

The School of Agriculture which was started in Madras in mid-1880s was possibly the Sydapet Agricultural Farm. It appears that the students of this particular school formed the Association at Sydapet and started bringing out their *Journal*.

### **Indian Tea Association**

Tea plantation in India started in 1830s gave rise to the birth of tea industry. The industry started flourishing with the passage of time. In order to coordinate the activities of the tea industry, Indian Tea Association was formed in 1881 to promote tea plantation, manufacture, trade, commerce and industry. The Scientific Department of the Association was inaugurated in 1900 in the Indian Museum of Calcutta and one field station was established near Mariani in Assam in 1903. The Association has continued till date and is now called Tea Research Association [Kundu, p.5]

**United Planters' Association of Southern India** was established in 1893 to promote the interests of planting products. The Association survives to date [Kundu, p.5]

**Photographic Society of India** was founded in India in or around 1888. It functioned from 29 Chowringhee in Calcutta and had a reading room. The Journal brought out by the Society had the longest life among all photographic journals published from the country, and continued till 1927.

### **Government Departments**

The activities which various departments started earlier continued. Of course, in some areas like meteorology and agriculture, the activities intensified following the recommendations of the Famine Commission. For example, during 1880 to 1900 as many as 28 new periodicals on meteorology started, the number being almost equivalent to the number started during 1800 to 1879, i.e. 29. The spread of various offices, departments, etc in different presidencies, provinces, and states is being discussed briefly.

#### **Department s of Land Records and Agriculture**

The Department of Land Records and Agriculture, whose number was only one prior to 1876, started multiplying as similar departments started in North-Western Provinces and Oudh (1877), Madras (1877), Assam (1882), Bombay (1883), Bengal (1885), Central Provinces (1888), Punjab (1889), and Hyderabad Assigned Districts (1891).

### **Department of Forensic Chemistry**

The 19<sup>th</sup> century witnessed the establishment of quite a few chemical examiner's department. The functions of all of them were partially devoted to forensic chemistry. The department started in Mysore in or around 1877 is the only department of the 19<sup>th</sup> century devoted exclusively to forensic chemistry.

### **Departments of Survey and Settlement Operations**

The activities which were systematically continuing since long spread during the period to Assam, Bengal, Bihar and other places through these departments.

### **Geology Departments**

The departments came into existence in Travancore, and Mysore in the last decade of the century.

### **Public Health Departments**

Activities related to public health received further boost with the establishment of the departments in Mysore, Rajputana, Hyderabad and Central India Agency.

### **Veterinary Departments**

Veterinary education in the country started in late 1870s, veterinary periodicals in 1880s, and veterinary departments in 1890s. The first departments started in early 1890s in Bengal, North-Western Provinces, and Army Veterinary Departments under the Government of India also during this period.

### **Mining Department**

During British period mining in India started with the mining of coal in Raniganj in 1820 [*Encyclopaedia Britannica*, p187]. However, the Department of Mines started only in 1890s, that too in Mysore. Office of the Inspector of Mines came into existence in 1890s in Mysore and also under the Centre.

### **Railways Department**

Railways, for a long time remained the Branch of Public Works



Department of Madras, Bengal and India. Only in 1890s Railway Department was started under the government of Bombay.

### **Irrigation Branch**

Like railways, irrigation activity also formed part of Public Works Departments of various presidencies, provinces and states. During the period, Irrigation Branch of Public Works Departments started at Bombay, Madras, North-Western Provinces and so on.

### **Forestry Department**

The Department of Forestry continued to appear during this period also. Mostly, these departments emerged in states like Baluchistan, Hyderabad, Jeypur, Jodhpur, Jammu and Kashmir, and Travancore.

### **Horse Breeding Department**

The Departments of Horse Breeding Operations started in 1880s, under the Government of Bengal as well as Bombay.

### **Office on Explosives**

The Office of the Chief Inspector of Explosives of the Government of India started in or around 1900 and it was most probably located in Nagpur. It seems to be the last department related to science that was started by the Government of India in the nineteenth century.

Political and educational developments took place during the period contributed indirectly to the birth and growth of scientific periodicals. However, scientific organisations like surveys; observatories; laboratories; botanical, zoological and horticultural gardens; agricultural experiment stations; scientific societies and associations; and departments related to science and technology; in most cases contributed directly to the birth and sustenance of scientific periodicals.

### **Periodicals**

This period witnessed the birth of the first periodical/s in a number of subjects such as quinology (1878); tobacco (1879); veterinary science (1881, 1882); agricultural implements and machinery (1882); gardening (1884); coffee (1885); anthropology (1886); architectural decorative art (1886); rice

(1887); linseed (1887), wheat (1887); natural science (1887); microscopy (1888, 1890); minerals (1888); entomology (1888); mathematics (1889); indigo (1889); inventions (1890); oilseed (1890); sesamum (1890); textiles (1890); photozincography (1892); jute (1893); mines and mining (1893); patents (1894); printing (1895); sugarcane (1897); and poultry (1900).

The first abstracting and indexing periodicals from India called *Calcutta Medical News: a Monthly Abstract of Medical Literature* (1880) and *Index to Applications for the Registration of Designs* (1880) also appeared during this phase.

Table 7 portrays the growth scenario of the periodicals according to types during 1877 to 1900. Reports as usual top the list numbering 166, followed by journals (157), data periodicals (70), proceedings (11) and other types (37). The Table indicates that new periodicals appeared every year varying from a minimum of 7 in 1998 to a maximum of 31 in 1995. On average more than 18 periodicals appeared per year. As in the previous sections, here also journals will be dealt with first followed by other types of periodicals. As the number of journals are quite high, English journals will be dealt with first followed by regional language journals. Then other types of journals will be taken one by one.

### **Journals**

Of the 156 journals 95 are in English, followed by Bengali (53), Hindi (2), Marathi (2), Urdu (2), Gujarati and Portuguese one each. The number of journals being high, they will be grouped according to broad subjects and important ones will be discussed. The rest can be seen from the List of Periodicals arranged in chronological order.

### **English Journals**

#### **Museology**

Prior to this period, several periodicals appeared in the form of reports, proceedings, etc. Journals on museology, i.e. *Indian Museum Notes* (1889), and *Bulletin of the Government Museum, Madras* (1894) appeared only during this period that published articles including research papers.

Table 7 - Growth of Indian Scientific Periodicals (according to types) during 1877 - 1900

Year	Journal	Report	Proceedings	Data	Others	Total
1877	4	13		4	1	22
1878	1	12	1	1	1	16
1879	3	4		2		9
1880	4	5		1	3	13
1881	2	10			2	14
1882	3	6	2		2	13
1883	8	7	1		1	17
1884	10	7			3	20
1885	12	8		4	1	25
1886	7	2		1	1	11
1887	7	8	1	7	1	24
1888	6	7		3	1	17
1889	8	4	1	3		16
1890	7	5	1	2	4	19
1891	5	4		8	3	20
1892	9	8	1	6	3	27
1893	7	12		6		25
1894	13	6	1	4		24
1895	16	8		7	1	32
1896	8	6	1	5	2	22
1897	4	3	1	2	1	11
1898	3	3			1	7
1899	4	9		2	1	16
1900	6	9		2	4	21
<b>Total</b>	<b>157</b>	<b>166</b>	<b>11</b>	<b>70</b>	<b>37</b>	<b>441</b>

### Industry

Journals on industry were not encountered prior to 1890s. Attention was paid towards the development of various industries quite late in the century. Industrial societies started emerging from around 1880s and

journals like *Industrial Quarterly Review of Western India* (1892), and *Journal, Society for the Promotion of Indian Industries* (1892) started appearing.

### Science in General

*Asiatick Researches* reappeared as *Asiatic Researches* (1884) with the changed spelling of Asiatic. The second journal *Orientalist: a Journal of Oriental Literature, Arts and Sciences, Folklore, etc* (1884), an important journal of the century was partially devoted to science. The third one, *Bulletin, Madras Government Museum - Science Series*. (1887), was purely scientific.

### Natural Science

*Indian Annals and Magazine of Natural Science* (1887) seems to be the only journal of the century exclusively devoted to the subject. Even in the 20<sup>th</sup> century no journal covering the entire gamut of natural science appeared from this subcontinent. However, many journals pertaining to various branches of natural science like chemistry, geology and biology appeared both in the 19<sup>th</sup> and 20<sup>th</sup> centuries.

### Natural History

*Journal of the Bombay Natural History Society* (1886), and *Journal of the Simla Natural History Society* (1886) seem to have started in the same year. The former, being the topmost journal in the field from India, has been publishing for more than one hundred years. The latter possibly did not publish beyond the first year of its existence.

### Surveying

A number of periodicals on the subject appeared in the form of reports of topographical survey, trigonometrical survey, etc. However, *Professional Papers, Survey of India* (1900) seems to be the only learned journal of the period on the subject.

### Geology

The period witnessed the emergence of four journals - *Cyclone Memoirs, India* (1888); *Quarterly Notes of the Geological Survey of India* (1894); *Record, Mysore Geological Department* (1894); and *Memoirs of the Geological Department, Mysore State* (1900), of which *Cyclone Memoirs, India* seems to be the first journal on the subject in the world.

### **Meteorology**

*Mysore Meteorological Memoirs* (1895) is the only journal of the period on meteorology.

### **Anthropology**

Papers on anthropological studies started appearing in India in 18<sup>th</sup> century itself, however, the appearance of a full-fledged journal on the subject i.e. *Journal of the Anthropological Society of Bombay* (1886) took about a century. The century saw one more journal on the subject called *Anthropological Bulletin, Government Museum, Madras* (1896)

### **Microscopy**

It seems quite surprising that conditions prevailing in India paved way for the birth of the journal *Bulletin, Microscopical Society of Calcutta* (1890) on a very narrow discipline like microscopy in 19<sup>th</sup> century itself. Even in 20<sup>th</sup> century journals on the subject are hardly encountered.

### **Botany**

A few periodicals on botany appeared earlier in the form of reports. None of them, however, were learned journals. *Annals of the Royal Botanic Garden, Calcutta*. (1887) was a first grade journal on botany from India. The journal of huge size (14" x12") (some volumes even bigger) provided species by species description of plants with the size to size illustration of their leaves, fruits, etc to facilitate easy identification. No journal of its types appeared even in 20<sup>th</sup> century. *Records of the Botanical Survey of India* (1893) was yet another important journal on the subject.

### **Zoology**

The period saw the birth of *Fauna of British India including Ceylon and Burma* (1888), the most important and the only journal devoted to entire animal kingdom from India. The articles appeared in the journals were all monographic. It continues to date. This apart two more journals pertaining to entomology appeared during the period: *Notes on Economic Entomology* (1888); *Departmental Notes on Insects that Affect Forestry* (1900).

## Medicine

The period saw the birth of twenty journals that published numerous articles, case studies, research papers, notes and news, obituaries and so on. Journals on narrower disciplines like pharmacy (1894, 1896) and pharmacology (1896) also started appearing in English from this period. From the research point of view the topmost journal of the period is *Scientific Memoirs by Medical Officers of the Army of India* (1884). It used to include special papers and reports. It may be noted that the best Indian medical journal of today - *Indian Journal of Medical Research* owes its origin to this particular journal. Journals like *Medical Record* (1880), *Journal of Medical Missions in India* (1895) as well as *Grant Medical College Magazine* (1899) set the examples of long-surviving journals on medicine. *Transactions, Calcutta Medical Society* (1880); *Transactions of the South Indian Branch, British Medical Association* (1884); and *Medical Reporter* (1892) were also important journals of the time.

## Engineering

In all, six engineering journals appeared during this period. Two belonged to engineering in general (1887, 1900), two to public works (1887, 1894); one to railways (1898), and one to telegraphy (1893).

## Agriculture

The period saw the birth of the largest number of periodicals (N= 33) in agriculture in the century which can be construed as a natural consequence of the Famine Commission's recommendation discussed earlier. The most important agricultural periodical of the period is the *Agricultural Ledger* and its various series. The publication appeared under the editorship of George Watt, the Reporter on Economic Products to the Government of India during 1892 to 1912, and was published by the Office of the Superintendent, Government Printing, India from Calcutta.

The objectives of the publication as given in vol. 2 were:

- (i) to provide information connected with agriculture or with economic products in a form which will admit of its ready transfer

to ledgers;

- (ii) to secure the maintenance of uniform ledgers (on the plan of the Dictionary) in all offices concerned in agricultural subjects throughout India, so that references to ledger entries made in any report or publication may be readily utilised in all offices where ledgers are kept;
- (iii) to admit of the circulation, in convenient form, or information on any subject connected with agriculture or economic products to officials or other persons interested therein;
- (iv) to secure a connection between all papers of interest published on subjects relating to economic products and the official *Dictionary of Economic Products*.

With this object the information published in these ledgers will uniformly be given under the name and number of the Dictionary article which they more especially amplify. When the subject dealt with has not been taken up in the Dictionary, the position it very possibly would occupy in future issues of that work will be assigned to it. It is to be noted that all the articles published were monographic and intended to update the articles included in the *Watts' Dictionary of Economic Products*.

Each article published in the *Agricultural Ledger* formed a unit in the various series brought under the general heading. A number of series emanated under the common title *Agricultural Ledger* such as *Agricultural Series* (1892); *Mineral and Metallic Series* (1892); *Vegetable Product Series* (1892); *Entomological Series* (1893); *Agricultural Implements and Machinery Series* (1893); *Miscellaneous Series* (1893); *Veterinary Series* (1893); *Special Forest Series* (1894); *Forest Series* (1895); *Medical and Chemical Series* (1895); *Special Agricultural Series* (1895); *Animal Product Series* (1896); *Crop Disease and Pest Series* (1896); *Special Veterinary Series* (1896); and *Industrial Series* (1897). Following more or less the same pattern as that of *Agricultural Ledger* the Department of Land Records and Agriculture, Bombay started bringing out its *Bulletin* from 1884, followed by Madras (1889), Assam (1894), Bengal (1895), North-Western Provinces (1895), and Berar (1897). Bengal brought out the *Bulletin* in two parts i.e. *Agricultural Series* and *Veterinary Series*.

Each issue of these Bulletins was devoted to one topic. For example: Bulletin nos. 1 & 2 of Bengal carried the list of principal crops grown in Bengal, and no. 3 was devoted to wheat. The same type of journal was brought out by Berar (1894) and Central Provinces (1895) with the title *Agricultural Ledger Series*.

Experiments with crops ensued following the recommendation of the Famine Commission. Information relating to these experiments were brought out with the title *Crop Experiments and Annual Note on Crop Experiments* (1877, 1889, 1894).

During the period journals also appeared on tea (1877), plantation (1880s), agriculture in general (1885, 1886, 1892), irrigation (1898), gardening (1884, 1897, 1899), poultry (1900). Apart from the *Veterinary Series of Agricultural Ledger*, two regular journals on veterinary science also appeared (1882, 1890).

### Printing

Printing started in India way back in 1550s. It took more than 350 years for the appearance of the first Indian journal called *Indian Printers Journal* (1895) on the subject.

### Textiles

Only one journal called *Indian Textile Journal* (1890) appeared in the 19<sup>th</sup> century on this subject. The journal reigned supreme in its own domain both in the 19<sup>th</sup> century and the 20<sup>th</sup> century.

### Photography

Two photographic journals appeared during this period, one in 1888, and the other in 1894.

### Portuguese Journals

The period saw the emergence of only one Portuguese journal, i.e. *Arquivo Medico da India* (1894) that was devoted to medicine.

### Bengali Journals

In all 54 Bengali journals appeared. All these journals appeared mostly through individual efforts, without any institutional or government



support. All of them were popular in nature, most of them were short in life span and published as a monthly. The objective was to disseminate scientific information to common people. They covered a wide spectrum of scientific subjects. Of the journals, two were on industry, eight on science in general, one on mathematics, the largest number (N=31) on medicine [medicine in general -20, homoeopathy -8, Ayurveda - 3], one on civil engineering, seven on agriculture, two on home science, and two on food. [vide Language Index].

### **Other Indian Language Journals**

One Gujarati (1889), two Hindi (1885, 1889), two Marathi (1883, 1892) and two Urdu periodicals also appeared during this time [vide Language Index]. Further research may bring to light some more journals in these and other Indian languages.

### **Reports**

As in the previous periods, the number of reports is the highest (N=166) in this period also. Table 7 indicates that new reports have appeared every year of this period, the number varying from a minimum of 2 in 1886 to a maximum of 13 in 1877. On average, seven reports appeared per year. A brief mention of these reports is being made according to subjects.

### **Museums**

The number of reports that started during this period number seven and pertained to Economic and Art Section, Indian Museum (1877), Government Central Museum, Madras (1878), Jeypore Economic and Industrial Museum (1881), Lucknow Provincial Museum (1885), Lahore Central Museum (1892), Collection for Indian Museum, Calcutta and Imperial Institute (1896), and Mysore Government Museum (1898).

### **Industry**

*Report of the Bombay Millowners' Association* (1881), the only report of the century devoted to industry encountered in the study possibly reflects the state of industrial development in the century in India.

### **Wild Life Preservation**

Great emphasis has been laid during the last few decades of the 20<sup>th</sup> century towards the conservation of nature, protection of environment, and so on. The *Annual Report of the Nilgiri Game and Fish Preservation Association* (1893) indicates that some people of great foresight started working on this more than a hundred years ago. This might prove to be an important document for the historians dealing with the subject - Nature preservation.

### **Surveying**

The reports on this subject number six and are on the operations of Survey of India (1877); survey and settlement operations in Assam (1883), and in Bengal (1890); operations of the Madras Survey Department (1892), settlement surveys in Bengal (1899), and narrative reports of the officers of the Survey of India (1900).

### **Chemistry**

The Annual Report of the Chemical Examiner of Mysore (1877) is the only report on the subject appeared in this period.

### **Geology**

The two reports that appeared are the reports of the State Geologist, Travancore (1890) and of the Mysore Geological Department (1894).

### **Meteorology**

The reports of the Meteorological Reporter to the Government of North-Western Provinces and Oudh, and of Madras started appearing from 1877 (or before) and 1881 respectively followed by reports of rainfall registration in Mysore (1893), G. V. Juggarow Observatory (1895) and the Inspection Report of the Colaba, Alibagh, Madras, and Kodaikanal Observatories (1899).

### **Archaeology**

Archaeological works during the period continued in full swing and a number of reports started appearing containing detailed description of

the archaeological surveys of Madras and Coorg (1881), Southern India. (1882, 1888), North-Western Provinces and Oudh (1887), Punjab Circle (1888), Western India (1889), Madras (1895) and Bengal Circle (1900). From the dates of the reports it can be noted how the work started spreading all over India with the passage of time. The Epigraphical and Architectural Branches of Survey of North-Western Provinces and Oudh also started publishing reports from 1888.

### **Bacteriology**

The establishment of the bacteriological laboratory discussed earlier was an important event of the period. The laboratory started publishing its report from 1895.

### **Microscopy**

The discovery of microscope occasioned the birth of bacteriology. In India also, the establishment of Microscopical Society of Calcutta and Imperial Bacteriological Laboratory was more or less contemporaneous. The report of the Microscopical Society of Calcutta started publishing from 1888 was the first report on the subject from India.

### **Botany**

The last part of the 19<sup>th</sup> century saw the establishment of quite a few botanical gardens and parks. These gardens (and parks) also started producing reports. The reports of the gardens and parks in Nilgiris started in 1880 followed by Poona (1884), Oodeypur (1884), Nainital (1885), and Mysore (1897). The Report of the Botanical Survey of India stated coming out from 1893 .

### **Zoology**

Unlike botanical gardens, the British showed little interest in establishing zoological gardens. The only zoological garden available in this record is that of Calcutta. The garden started issuing its report from 1886.

### **Patent**

East India Company passed the Patent Act in 1856, and thereafter started the activities relating to the registration of designs etc. Subsequently,

the Patent Office was established which started publishing its report from 1894.

### **Medicine**

As in the previous period, this period also witnessed great medical activities giving birth to general hospitals, lock hospitals, dispensaries, sanatoria, lunatic asylums, leper asylums, medical institutions and missions, etc. Vaccination activities continued in different provinces, and states. All these led to the birth of the 47 reports. These included reports of **lunatic asylums** of Berar (1877), Bombay (1877), Agra (1877), North-Western Provinces and Oudh ( 1884'); Delhi and Lahore (1884'); Mysore ( 1885); and United Provinces of Agra and Oudh (1900); **leper asylum**, Dehra Dun (1888') and Central Asylum, Lahore (1900); **medical and/or sanitary reports** of Mysore (1877), the native army of Bombay ( 1877), the Rajputana States and Central India Agency ( 1883); reports of **hospitals** including Mayo Hospital, Lahore (1877), Calcutta Hospitals, Nurses Institution and the Lady Canning Home (1878), Lister Hospital, Allahabad (1880), Allahabad Eye Hospital (1887), Lock Hospitals, Lahore (1887), Kashmir State Leper Hospital (1891), Government Maternity Hospital, Madras (1892), Junagadh State Hospital (1894), Madras Police Hospitals (1896'), General Hospital, Madras (1899); as well as annual/triennial reports of **hospitals and/or dispensaries** of Bengal (1887), North-Western Provinces and Oudh (1890), Assam (1894), Special State Hospitals in the Presidency Town of Madras (1891); reports on **vaccination**, Mysore (1878); Coorg (1878), Bengal (1887), and Ulwur State (1893); reports of **sanatoria** like the Eden Sanitarium, Darjeeling (1883), and Lowis Jubilee Sanitarium, Darjeeling (1887); reports of **medical institutions** such as Jeypore Medical and Meteorological Institution (1885' ); National Association for Supplying Female Medical Aid to the Women of India ( 1885), Medical Institutions, Madras City (1896), Plague Research Laboratory (1896), Civil Medical Institutions, Bombay [City] (1899); King Institute of Preventive Medicine ( 1899); Pasteur Institute of India (1900) ; and Civil Medical Institutions, Madras City (1900).

These apart the period saw the emergence of the reports of the Government Quinologist (1878); Sanitary Report forwarded by the Adjutant-General to the Secretary of the Government (1880); Health Officer

for the Port of Calcutta (1881'); Civil Medical Department of His Highness the Nizam's Government (1888'); Homeopathic Medical Report (1892); and report of the Kashmir Medical Mission (1895').

### Engineering

In all 13 reports pertaining to engineering, railways, steam boilers and prime movers, mining, various branches of public works, started during this period. One report was partly devoted to communications. It is clear from the reports that the activities on the railways were increasing; public works departments were branching out to take extra care of buildings, roads, and irrigation; inspection activities of mining, steam boilers and prime movers were being undertaken.

Of the reports five belonged to **Public Works Department (PWD)** Bombay, Bengal and Mysore. The reports of Bombay PWD belonged to Buildings and Roads Branch (1877), Military Works (1885), and Civil and Military Works (1900); and that of Bengal to Irrigation Branch (1894). There were five reports also on **railways** (one partially) pertaining to Bengal (1878, 1895), India (1879), and Bombay (1896). The fifth report was devoted to a branch of the railways, i.e. steam boilers and prime movers (1897). There were two reports on **mining**- one on inspection of mines in India (1893), and the other on inspection of embankments and drainage relating to mines, Mysore (1894). Local Self Government Engineering Department of North-Western Provinces and Oudh started producing its report probably from 1896 or before.

### Agriculture and Related Subjects

The 55 reports that started publishing in this period in agriculture and related disciplines indicate how seriously the agricultural and related activities were undertaken by the government following the recommendation of the Famine Commission. Some of the princely states also took measures in this direction. The reports indicate that a number of experimental farms were established at such places as Bhadgaon, Burdwan, Dumrao, Hyderabad, Khandesh, Sibpore, Nagpur, and Surat became functional; the departments of land records and agriculture commenced functioning in the presidencies and states; agricultural chemists were

appointed in two states.; forecasting of various crops like wheat and rice was undertaken (vide Data Periodicals); attention was also paid to such crops as cinchona, sugarcane, indigo, linseed, rapeseed, sesamum, and tobacco; agri-horticultural societies also sprang up at few more places; emphasis on forestry continued as before, and animal husbandry and veterinary departments also came into being. The number of reports being high, a brief mention is being made about them under a few headings like Agriculture and Horticulture, Irrigation, Forestry, and Animal Husbandry & Veterinary Science.

### **Agriculture & Horticulture**

Reports that started during this period include reports of the **departments of land records and agriculture** or similar bodies. The Department of Agriculture and Commerce, North-Western Provinces and Oudh brought out the report in 1877; followed by Assam (1882); Bombay Presidency (1883); Bengal ( 1885); Central Provinces (1888); Punjab (1889); Hyderabad Assigned Districts (1891); Berar ( 1892); and Coorg (1897).

The period also gave birth to several reports relating to **crops**, including cotton report of the Hyderabad Assigned Districts (1877); reports on tobacco operations at Ghazipur and Pusa (1879), sugar production in the Central Provinces (1882); indigo, linseed and rapeseed crops, North-Western Provinces (1889); til (sesamum or gingelly) crops, North-Western Provinces (1890); and sugarcane crop, Bengal (1899).

The **agricultural and/or horticultural gardens, experimental farms**, that were established also started issuing their respective reports. These include reports of the horticultural gardens, Lucknow (1878); Nagpur Model Farm (1879); Agri-Horticultural Garden, Lahore (1881); Experimental Farms at Bhadgaon in Khandesh and Hyderabad in Sind (1881); Government Farm, Hyderabad (1883); Khandesh Experimental Farm (1883 ); Nagpur Experimental Farm (1883); Government Experimental Farm, Poona (1892); Burdwan Experimental Farm (1893); Dumraon Experimental Farm (1893); and Sibpore Experimental Farm (1893).

**Agri-horticultural societies** that started publishing reports during this time encompass Agri-Horticultural Society of Nagpur (1880), of Punjab (1880), and of India (1885).

The appointment of **agricultural chemists** by the Government of India and of Mysore was an important step taken at this period. The *Annual Report, Agricultural Chemist, India* appeared in 1893, and that of Mysore in 1899. Reports on **irrigation** came out only from Punjab (1878, 1899); and North-Western Provinces and Oudh (1882).

### **Forestry**

Reports that came out during this period pertain to forest administration, arboriculture, forest surveys and canal plantations. **Forest administration reports** pertained to Baluchistan (1881); Hyderabad (1881), Andamans (1884); Jeypore (1886); Jodhpur State (1890); Jammu and Kashmir State (1891); Travancore (1892); Kolhapur (1895); and Cochin State (1900). Reports on **arboriculture** appeared from Berar in 1877, followed by North-Western Provinces and Oudh (1879); and Hyderabad Assigned Districts (1881). Two reports on **forest surveys** also started, the first by Forest Survey Branch, India in 1882 and the second one by Bengal Presidency probably in or before 1898. The only **canal plantation** report of the period that started appearing from 1884 goes to the credit of North-Western Provinces and Oudh. The period saw the establishment of the first two **forest schools** in India. Both started publishing their reports - Forest School, Dehra Dun from 1878, and School of Forestry, Poona probably from 1898 or before.

### **Animal Husbandry and Veterinary Science**

The British laid great emphasis on horse breeding and veterinary medicine in the last phase of the 19<sup>th</sup> century resulting in the establishment of respective departments. All these departments started bringing out their annual reports depicting their activities. The first report of the Department of Horse Breeding Operations of the Bengal and Bombay Presidencies appeared in 1881, and then of Bombay Presidency alone in 1888. Annual reports of Civil Veterinary Department, Bengal, and of North-Western Provinces and Oudh came out in 1893; and that of India in 1895 or before.

### Photozincography

*Annual Report, Photozincographic Department, Bombay* (1892) is the only report on the subject relating to printing that has been recorded during the study. Possibly, the method did not spread to other parts of the country and become popular.

### Chemicals

In all there are three reports on this subject - two pertain to salt and one to explosives. Both the reports on salt started in 1878, one by the government of Sind and the other by the Presidency of Fort St. George. The report of the Chief Inspector of Explosives in India started appearing from 1900.

### Photography

The appearance of quite a few journals on the subject during the century provides indication about the popularity of the subject among people. Possibly, that was the reason for the establishment of the Photographic Society of India, which started publishing its report possibly from 1895 or before.

### Proceedings

In all eleven proceedings or similar periodicals appeared in this period. Six of them pertained to medicine, two to agriculture, and one each to museum, botanical gardens, and railways. The **medical** proceedings belonged to the activities of Sanitary Commissioner for Madras (1878, 1882), Allahabad Medical Society (1882); Grant Medical College Society (1887); Indigenous Drugs Committee (1896); and Bombay Medical and Physical Society (1897). One **agricultural** proceedings pertained to the Agricultural Conference held in the Revenue and Agricultural Department at Simla (1890) and the other one to United Planters Association of Southern India (1894). The proceedings on **museum, botanical gardens and railways** belonged respectively to Province's Museum, Lucknow (1883); District Gardens in the Central Provinces (1892); and the Locomotive and Carriage Superintendents Committee (1889).



## Data Periodicals

The number of data periodicals appeared during this periodical is quite large (N=70). Of these 23 periodicals belonged to meteorology, 3 to minerals, one to medicine, 42 to agriculture, and one to irrigation. The subject-wise distribution of the periodicals is indicated below in chronological order.

### Meteorology

The periodicals brought out related to **meteorological observations** in the North-Western Provinces and Oudh (1877), Western India (1885); and Punjab (1886); and also of the Alipore Observatory (1877), six stations in India (1879); Bangalore, Mysore, Hassan, and Chitaldroog observatories (1893); and the Monsoon Period (1888). A few periodicals recorded **rainfall** in the North-Western Provinces and Oudh (1877), Bengal (1877), and India (1887, 1891). Several others presented **daily weather report** of India (1878), Bay of Bengal (1880), Bombay (1889), Indian Monsoon Area (1893) and Madras (1894). Periodicals were also brought out to incorporate data of the thermometrical observations (1885); climate variations (1889); daily meteorological means of the Madras Observatory (1896); general weather conditions of India during the Monsoon Period (1896); and so on.

### Minerals

Periodicals on mineral statistics started appearing from 1888. Two more appeared in 1889 and 1894.

### Medicine

Data periodicals on medicine were found to be few. During the last phase of the 19<sup>th</sup> century only one such periodical related to vaccination in Bengal (188) was encountered.

### Agriculture

Of the data periodicals in agriculture, the largest number (20) pertained to **forecasting of crops** and they appeared in the following chronological order. Forecast of cotton crops, Punjab (1887); linseed crops, Central Provinces (1887); wheat crops, Punjab (1887); wheat crops, India (1887);

cotton crops, India (1890); oilseed (rape, mustard, and linseed) crops, India (1890); rabi, oilseeds and linseed crops, Punjab (1891); bhadoi crops, Bengal (1891'); rice crops, Bengal (1891'); cotton crops, Bengal (1892'), rice crops, India (1891); cotton crops, Central Provinces (1892'); indigo crops, Punjab (1892'); wheat crops, Bengal (1892'); jute crops, Bengal (1893'); oilseed crops, Bengal (1893'); sesamum crops, Punjab (1893'); rabi crops, Bengal (1894); indigo crops, Bengal (1896'); and sugarcane crops, Punjab (1899').

TABLE 8-GROWTH OF INDIAN SCIENTIFIC PERIODICALS (ACCORDING TO SUBJECTS) DURING 1877 - 1900

Year	Sci	Surv	Chem	Geol	Met	Arch	Bot	Zool	Med	Engg	Agr	For	Oth.	Total
1877		1	1		5				10	1	2	1	1	22
1878					1				7	1	3	1	3	16
1879					2					1	4	1	1	9
1880	1				2		1		5		3		1	13
1881					1	1			4		2	3	3	14
1882	1					1			3		6	1	1	13
1883	1	1			1				5	1	6		2	17
1884	2	1					3		8		4	2		20
1885					2		1		10	1	9		2	25
1886	1				1			1	1		1	1	5	11
1887	1			1	1	1	1		7	3	7		2	24
1888				1	2	3		2	4		2		3	17
1889				1	2	1			4	1	5		2	16
1890		1							5		7	1	5	19
1891	2				2				5	1	8	1	1	20
1892		1			1		1		6		13	1	4	27
1893					3		2		2	2	13		3	25
1894	1			4	1				5	2	7	1	4	25
1895					2	1			7	1	14	2	4	31
1896					2				6	3	9		2	22
1897							1		3	1	5		1	11
1898										1	1	2	3	7
1899	1				1				7		5		2	16
1900		2		1	1	1		1	4	4	3	1	3	21
<b>Total</b>	<b>11</b>	<b>7</b>	<b>1</b>	<b>8</b>	<b>33</b>	<b>9</b>	<b>10</b>	<b>4</b>	<b>118</b>	<b>24</b>	<b>139</b>	<b>19</b>	<b>58</b>	<b>441</b>

The Government of Madras did not bring out any periodical devoted to forecasting. On the other hand, it brought out periodicals providing information on the **outturn of various crops** in the state such as cotton crops (1892); gingelly crops (1892); indigo crops (1893); rice crops (1895); groundnut crops (1896); and sugarcane crops (1897). Bengal government also brought out a periodical of this type devoted rabi crops (1896). Assam started bringing out **season and crop report** in 1893 followed by Mysore (1899), and Central Provinces and Berar (1900).

Periodicals devoted to **agricultural statistics** in general came out from Punjab (1885), and Bengal (1891, 1894). Bengal also started two periodicals providing preliminary and final estimates of bhadoi crops (1895) and winter rice crops (1895), and one on average prices of staple food crop (rice) in 1887. Coorg started publishing a periodical on coffee crop in 1885. The Government of India started bringing out data periodicals related to yield of principal crops in India from 1891; coffee, tea and cinchona, all from 1895.

One data periodical on **irrigation** and another on **veterinary science** also started respectively in 1887 and 1895.

## Others

In this category are placed those periodicals that did not fall in the categories described above. Here, after each category, the date of starting is given for locating the same in the List of Periodicals. The category-wise distribution is as follows: abstracting periodical (1880), indexing periodicals (1880, 1885, 1890) directories (1890, 1891, 1892), administrative accounts (1881, 1884, 1891), circulars (1900), historical accounts (1877, 1891, 1900), illustrations (1886), lists (1882, 1900), memoranda (1883, 1888, 1890, 1892), notes (1884, 1895, 1896), notices (1887), returns (1881, 1884, 1897, 1900), statements (1878, 1896, 1898). Brief sketch of meteorology (1880) and returns relating to vaccination etc seem to be data periodicals. They could not be placed under the respective category as their contents could not be physically verified.

### Subject-wise Distribution

Table 8 records the growth of periodicals for the period 1877 -1900 according to subjects. During the period agriculture recorded the highest growth with a tally of 139 followed by medicine ( 118), meteorology (33), engineering (24), forestry (19), science in general (11), botany (10), archaeology and irrigation 9 each, geology (8), surveying (7), zoology (4) and chemistry (1). Fifty-eight periodicals are placed in the others category. Arranged in descending order of frequency they pertain to museology (10); animal husbandry and veterinary science (9); industry (6); chemicals (3); designs, inventions and patents (3); gardening (3); photography (3); natural history (2); anthropology (2); bacteriology (2); microscopy (2); printing (2); food (2); textiles (2); conservation of nature (1); natural science (1); mathematics (1); poultry (1); and architecture (1).

### CONCLUDING REMARKS

I am indeed happy that my 30 years work is going to see the light of the day. A sincere attempt has been made in this work to present a comprehensive listing of all periodic publications devoted to science, that appeared from this subcontinent till 1900 covering all its aspects including field surveys, experimentation, observation, data collection, popular presentation, and of course mundane application. The methodology adopted was to cover all periodic publications.

To what extent the attempt has been made meaningful the following figures may reveal. *National Union Catalogue of Scientific Serials in India* the most comprehensive tool produced so far covers 400-odd titles, whereas the coverage of this document is 725. *British Union Catalogue of Periodicals (BUCOP)*, the most comprehensive catalogue of British Commonwealth has covered about 170 Indian scientific periodicals, and the coverage here is more than four times. Neelameghan has covered 78 medical journals up to 1900, whereas this one covers 90. Moreover, in several cases, information provided by Neelameghan has been enriched and some dates corrected. Kumar in his PhD work covered about thirty journals which appeared till 1900. The coverage of journals in the present work for the same period is

240. Bandyopadhyay made all possible attempts to ensure a comprehensive listing of all Bengali periodicals. Even in this case I have been able to find out two titles missed by him. The titles are: *Hindusthāner Kṣetra o Baganera Kṛṣi Samājer Kṛta Karmar Bibaranapustaka* (1820/28) and *Bhārat-Varṣiya Kṛṣi-Viṣayak Vividha Saṁgraha* (1854)

The figures given above clearly indicate the comprehensiveness of this study. The study has been an attempt not only to enlist all journals but also other types of periodicals including reports, data periodicals, directories, periodic memoranda, circulars, notices, etc. The coverage of all these makes the study not only comprehensive but also unique. The growth of scientific periodicals being closely related to political, educational, scientific and technological development of a nation, an attempt has been made here to relate the growth with all the aforesaid developments in India. An analysis from the point-of-view of growth, subject, type and language has also been attempted to show the rate of growth, emphasis laid by the government on various matters such as survey, agriculture, public health and so on; development of various types of periodicals, including those published in regional languages. In these regards also the study is unique and fills up many gaps left by the predecessors.

### **State of Preservation in the Libraries**

This is being written with a deep feeling of sadness and loss. Anyone who has seen the pitiable state of the documents in our libraries harbouring the intellectual output of hundreds of intellectuals of the nineteenth century comprising fearless explorers, keen observers, perseverant researchers, great thinkers, and so on, cannot but help feeling sad. The exemplary sincerity with which an individual has observed facts, recorded them in the most faithful language in the periodicals of the time, are today either extinct or on the verge of extinction. The documents that were consulted during the course of this study in the libraries situated across the country, some of them were in such a bad shape, that a researcher next to me, may find them in totally unusable condition, or may not find them at all because, the librarian in the meanwhile may take liberty of disposing them, thinking that it outlived its utility. Let us take some a concrete example. In one

agricultural library in Delhi, in 1960s there were some thirty Indian periodicals belonging to nineteenth century. All these periodicals were physically verified for collecting data for the union catalogue NUCSSI. When in 1992, the author consulted the same library for this work, not more than fifteen titles could be retrieved. It was learnt that many of the older periodicals have been weeded out by a learned librarian who served the library for sometime. The library even though, one of the richest libraries in the country in the field of agriculture, has never thought of preserving the older documents. No document of the library has ever been laminated, no book has ever gone through thymol chamber. I am told that one enthusiastic librarian started taking microfilms of some documents for the purpose of preservation. The moment the librarian left, the operation stopped, and today one may not find those microfilms even.

Plenty of such examples can be given to prove that the concept of preservation of documents is today practically absent in most of the Indian libraries. Neither there is any real urge to take action for preservation. The libraries that have seriously taken the matter can be counted on fingers.

Every nation in the world preserves or tries to preserve its heritage. We should not be an exception to the rule. If preservation of periodicals is our prerogative, then ways and means will have to be found out right now. Any further delay will mean loss of some titles forever. A model for the preservation is being proposed.

Preservation of periodicals will have to be viewed from two different angles, (i) the preservation of the document itself, and (ii) the preservation of the content of the document.

First of all, a government agency, National Library or any other, needs to be identified

- i) to frame a national policy on document preservation;
- ii) to conduct a survey to examine the availability and health of the older documents;

- iii) to declare the titles endangered following the policy guidelines. If an old title is available with complete or incomplete run, in only one or two libraries of the country, it should be forthwith declared endangered;
- iv) to make a library aware about the endangered title it is holding and issue guidelines as to its preservation;
- v) to make arrangement for preservation in such cases where the library does not possess the necessary facility for preservation;
- vi) to issue guidelines from time to time in respect of preservation;
- vii) to take steps to preserve the contents of the endangered document using such modern means as CD-ROM, WORM, microforms or any other facility depending on the availability of facilities and the condition of the document.

There are many periodicals which are apparently not available in India but available abroad.

There are many titles which are found to be non-existent in both Indian and foreign union catalogues. Apparently, they seem to be extinct. But the possibility of their availability in certain personal collection, little known libraries, etc cannot be ruled out.

Many periodicals started publishing in the early part of the twentieth century have also started decaying. Care should be taken to preserve them also before it is too late.

### **Historical Authenticity**

A few cases are only being cited to show how the errors are being perpetuated and with what casualness they are being committed.

Fermor, President of the Asiatic Society of Bengal and also the Director, Geological Survey of India for some years, in his Annual Address, 1934-35 wrote 'In Agriculture provincial Departments of Land Revenue and Agriculture, or of Agriculture alone, were formed towards the end of the

century: Bombay (1885), Madras (1889), Shillong (1894), Allahabad and Nagpur (1895), and Bengal (1896)' [Fermor, p.9-20].

Now, let us take the dates, " Bombay (1885)". The author had the opportunity to see the very first Report titled as *Annual Report of the Director of Agriculture of the Bombay Presidency*, dated 1883/84. This Report very clearly mentions that the Agricultural Department of the Bombay Presidency was constituted in 1883 following the suggestion given in the Famine Commission's Report, Part 1, pages 40-41" [vide page 1 of the Report]. The 1883/84 Report itself proves Fermor wrong.

The next date given in the quote is "Madras (1889)". There is clear indication that Report of the *Department of Revenue Settlement and Agriculture*, Madras started appearing from 1877/78 [BUCOP]. It is, therefore, obvious that the Department came into existence sometime in 1877, and not in 1889 as stated by Fermor. The U. S. Department of Agriculture has the Report for 1877/78.

The third place in the line is "Shillong (1894)". The author could see personally the 10th *Annual Report of the Department of Land Records and Agriculture* for 1892/93. From this one can easily calculate the date of the 1st Report to be 1881/82 or 1882. The U. S. Department of Agriculture Library has the Report from the very first issue, which is dated 1882/84. Possibly, the Department started in early 1882, as such, it did not cover the full official year 1881/82. There is indication that till 1885/86, the Department was known as Department of Agriculture, and from 1886/87 it became the Department of Land Records and Agriculture [*List of Serial Publications of Foreign Governments*, p.369 ]. Here also, Fermor has gone wrong by twelve years!

The places mentioned next are "Allahabad and Nagpur (1895)". It is to be noted that neither Allahabad nor Nagpur was a province in 1895. In fact, they were the capitals of the North-Western Provinces and Central Provinces respectively. The Department of Agriculture and Commerce of the North-Western Provinces seems to have been established in 1877/78, as the *Annual Report of Administration of the Department* for the year 1877/78 is still available in the Library of Congress [*List of Serial*



*Publications of Foreign Governments*, p.379]. In this case also Fermor has gone wrong by about two decades.

Report of the Department of Land Records and Agriculture, of the Central Provinces for the year 1888/89 is found to be the earliest report of the Department [*List of Serial Publications of Foreign Governments*, p. 366]. Hence, it is obvious that the Department was not started in 1895.

The last named place that figures in Fermor's statement is "Bengal (1896)". The First Report of the Agricultural Department of Bengal is dated 1885/86. [*List of Serial Publications of Foreign Governments*, p.354], which proves Fermor once again wrong.

Thus we see that all the dates given by Fermor are wrong. Not only this, in the statement quoted above, Fermor has mentioned 'provincial Departments. None of the six places he mentioned was a province in 1880s or 1890s. Bombay, Bengal and Madras were presidencies and Shillong, Allahabad and Nagpur were provincial capitals.

Later historians of science in our country have never tried to verify the veracity of Fermors' statement and have continued to perpetuate the mistake.

Prashad in his book *Progress of Science in India* [quoted Fermors' statement on the establishment of Departments of Land Records and Agriculture or of Agriculture alone verbatim. [p. xix].

Subbarayappa in his essay *Western Science in India...* writes quoting Prashad "It was only towards the end of the century that agricultural departments came into existence in a few places like Bombay (1885), Madras (1889), Shillong (1894), Allahabad (1895), Nagpur (1895) and Calcutta (1896)". [ p. 537].

While discussing about the Branches of the Royal Asiatic Society, Fermor in the same address writes "For some time the Asiatic Society was the only learned society in India, but in 1823 a new Asiatic Society, the Asiatic Society of Great Britain and Ireland (later the Royal Asiatic Society of Great Britain and Ireland) was formed in London... and this led to our

Society, the original Asiatic Society, being designated as the Asiatic Society of Bengal for ease of identification" [p. 17].

Now let us see the truth. Mitra in his article on the history of the Asiatic Society writes " The name adopted for the Society at the inaugural meeting was born on the records till the close of the fourth decade of this century. In 1829, soon after the establishment of the Asiatic Society of Great Britain and Ireland in London, and the affiliation of the Literary Society of Bombay with that institution, a letter was received from the latter offering to the Calcutta Society the privilege of being affiliated, and in this letter it was for the first time designated as the " Asiatic Society of Bengal", but the society did not accept the change. As the parent of the all the Asiatic Societies extant, it fitly retained its original name of the Asiatic Society" [Mitra, p.3-4]. Jain in his paper *Development of Life Sciences in India in Eighteenth-Nineteenth Century* makes the following statements: "Formation of the Royal Asiatic Society of Bengal by Sir William Jones (1746-1794) was yet another landmark in the scientific march of India" [p.153].

It is a well-known fact that the Society which William Jones founded was the Asiatic Society. The name was changed to Royal Asiatic Society of Bengal only in 1936, long after the death of the William Jones.

In the same paper *Asiatic Researches* has been spelt as *Asiatic Researches* not once, but twice (p.153,157); and it is also stated that the Zoological Survey of India was established in the middle of the 19th century", which is again a wrong statement as the Survey came into existence only in 1916 [Rajagopalan, p.244].

During the course of the study it has also been observed that our general historians, by and large, have bypassed many facts relating to applications of science and technology by the British for the welfare of India, and thus allowed themselves to project their imaginations rather than the hard facts. To substantiate this point, a part of a paragraph from *The Gazetteer of India*, a Government of India publication and is considered to be the most authentic source of information on India is being quoted. The paragraph reads as "The first important landmark in the health in the country was the appointment of a Royal Commission in 1859 to enquire

into the heavy mortality in the military and civil population in India. The Commission suggested that a public health authority with a Sanitary Commissioner at its head should be established, but very little progress was made until the importation of plague in Burma in 1896. This gave a real momentum. As a result of the Plague Commission in 1904, a Public Health Commission was appointed by the Government of India. "[22].

The paragraph says "very little progress was made until the importation of plague in Burma in 1896". Now, let us see the reality. The Sanitary Commissioners were appointed for Bengal, Bombay, Madras and the Centre following the recommendation of the Commission in 1863 to 1864 itself and their annual reports started coming from 1864. From 1864 to 1900, Sanitary Commissioner was appointed also at North-Western Provinces (c.1868). This apart, medical departments, civil hospitals, military hospitals, police hospitals, block hospitals, lying-in hospitals, sanitarium, mental asylum, were set up in substantial and charitable dispensaries in large number. Further, cinchona plantation started in Darjeeling and the Nilgiris in 1860, and the quinine factory at Darjeeling shortly thereafter to combat malaria. Vaccination for small pox started to be manufactured in different places in the country and vigorous inoculation activity, despite the public resistance, spread throughout the length and breadth of the country. The periodic publications, which recorded all these activities are 68 in number. By no standard, this can be construed as "very little progress". This instance clearly shows to what extent our celebrated historians have bypassed facts and made statements allowing subjectivity and their fertile imagination to reign supreme.

Whatever mistakes have been highlighted above by way of example seems to be the tip of the iceberg. Our writings on history of science of the modern period are in most cases sketchy, scattered, and riddled with errors and we Indians, by and large, consider the writings of the British or westerners as gospel. To disprove this the aforesaid writing by Fermor has been intentionally taken up. There are quite a few good books on the history of science in ancient India by such stalwarts as P C Ray, Satya Prakash, D P Chattopadhyay and so on. But there is none that covers modern period. Undeniably there is a need to write a comprehensive as well as authentic

history of science in India covering the modern period. If anybody or organisation undertakes such a job, I hope, this small work of mine will provide some data or indicate the source wherefrom necessary materials for the history can be gleaned. Even for the general historian this work is likely to provide many facts which so far has been ignored or overlooked.

#### ACKNOWLEDGEMENT

In the arduous task of the compilation of the data for this work I received constant encouragement and moral support from three great personalities of library profession of our country. They are late B S Kesavan, former Director, INSDOC; Shri S Parthasarathy, former Scientist-in-Charge, INSDOC; and late T S Rajagopalan, former Scientist-in-Charge, INSDOC. Without their encouragement, guidance and moral support, I would have given up the work long ago. I also have received substantial help from my numerous colleagues, friends and students who made rare documents accessible, supplied their photocopies, and painstakingly searched them out for me sometimes from the heaps of old documents. Unfortunately, it is not possible to name them all. Still, I must mention Mr Bimal Banerjee of National Library, Calcutta; Mr Guin of Geological Survey of India Library, Calcutta; Ms. Mitali Chatterjee of Asiatic Society Library, Calcutta; Ms Anuradha Roy Sen, PhD student of Jadavpur University, Calcutta; Mr Mohinder Singh of Indian Agricultural Research Institute Library, New Delhi; Mr S Moitra of Indian Council of Agricultural Research Library, New Delhi; Dr Malabika Roy, Forest Research Institute Library, Dehra Dun, Ms. Charanjit, Survey of India Library, Dehra Dun; Mr S C Sinha of Central Building Research Institute Library, Roorkee, who most ungrudgingly moved from stack to stack and shelf to shelf to ferret out old, brittle, and dusty documents of the nineteenth century required by me. The two persons who wanted to accelerate the completion of this work are Dr T Viswanathan, former Director, INSDOC and Prof Prabir Roychowdhury, my PhD guide and former Head, Department of Library and Information Science, Jadavpur University. Both of them were inexhaustible sources of encouragement for me. I most thankfully acknowledge my incalculable debt and express my gratitude to all of them for what they have done for me.

I am to conclude this Introduction with a very sad note. Mr J C Gera who worked with me in the initial phase of data collection was extremely eager to see the work in printed form. I am equally thankful to him for his help and feel sad for his untimely death.