

BOOK REVIEWS

Pradip Kumar Majumdar (Compiled and Edited)—*A Dictionary of Sanskrit-English Technical Terms, Vol. I—Mathematics*, Sanskrit Sahitya Parishat, Kolkata, India, First Edition, 2011. Price: Rs. 640/-

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It is indeed a very laudable effort that several volumes of Sanskrit-English dictionary of technical terms on different specialized subjects like Mathematics, Astronomy, Architecture... based on Sanskrit sources have been planned under general editorship of Professor Manabendu Banerjee (Secretary, Sahitya Parishat, Kolkata) and sponsorship of Rashtriya Sanskrit Samsthan (Delhi). The present volume on Mathematics has taken shape under the able guidance and supervision of Professor Pradip Majumdar, along with four of his collaborators: Bulbul Chakraborty, Rina Datta, Rajib Chakraborty and Subrata Mandal. To execute this kind of a job is indeed an extremely pain-staking experience, which requires not only specialization of the subject but also requires versatility in the language and traditional knowledge in Sanskrit having wide knowledge of the latest research work done in the field with varieties of ramification in its impact on regional languages in India. Professor Majumdar is an expert in early Indian and modern mathematics and well versed in Sanskrit and other sources. I am happy that he has spared his time and given his input to put the volume a meaningful format. There are many types of dictionaries but this project is unique of its kind because of intricacy involved in it.

The Sanskrit alphabetical order has been incorporated in collection of technical terms. Obviously it is serially arranged as per order of 11 vowels (*a, ā, i, ī, u, ū, r, e, ai, o, au*), followed by 27 consonants and conjoint consonants (*ka, kṣa, kha, ga, gha, ca, cha, ja, jha, ta, tra, ḍa, ḍha, na, pa, pha, ba, bha, ma, ya, ra, la, va, śa, ṣa, sa, ha*). In the process, technical words starting with vowels about 722 terms, consonants with terms from *ka* to *gha* 700, *ca* to *jha* 348, *ta* to *na* 530, *pa* to *ma* 944, *ya* to *ha* 1414, totaling about 4558 terms, have been identified. In this list the details of

authors, standard texts in addition to technical terms have also been taken into account. The details of technical terms have been compiled from a large number of major technical manuscript sources like, *Śulbasūtras* of Baudhāyana [BŚ], Āpastamba [ĀŚ], Mānava [MŚS], *Aṣṭādhyāyī* of Pāṇini [PA], *Āryabhaṭīya* [Abh] of Āryabhaṭa I, *Pañcasiddhāntikā* [PSi] of Varāhamihira, *Mahābhāskarīya* [MBh] and *Laghubhāskarīya* [LBh] of Bhāskara I, *Brāhma-sphuṭasiddhānta* [BrSpSi] & *Khaṇḍakhādyaka* [KKB] of Brahmagupta, *Gaṇitasārasaṅgraha* [GSS] of Mahāvīra, *Pāṭīgaṇita* of Śrīdharācārya [PS], *Bījagaṇita* [BB], *Līlāvati* [Līlā] and *Siddhāntaśiromaṇi* [SSi] of Bhāskara II, *Siddhānta-sārvabhauma* [SS] of Muniśvara, *Siddhānta-tattvaviveka* [STV] of Kamalākara, and so on stretching over a long period from early phase to 1800 AD. Beside these, a large number of secondary references like *History of Hindu Mathematics* by B. B. Datta and Avadesh Narayan Sing [HHM—BBD & ANS], *Indian Journal of History of Science* [IJHS], *Gaṇita Bhārati* [GB], etc have been liberally used. Significance of each term has been assessed with quotations from original sources with English translation wherever possible, followed by diagrams, tables, equations and examples.

One example from the Book (p. 303) as to its methodology will be of interest:

Guṇakāra—Co-efficient, multiplier [Abh.ii.27-28; BrSpSi.xviii.15, 64, 69-71; GSS.vi.286; P. rule 78; MSi. xv. 23 and so on; HHM-BBD&ANS, (2), p.9].

Abh.ii.27—*cchedāḥ parasparahatā bhavanti guṇakārabhāgahārāṇām* (The numerators and the denominators of the multipliers and divisors should be multiplied by one another; Eng tr by KSS). An example, $(a/b) / (c/d) = (ad) / (bc)$ is shown how the divisor becomes multiplier in fraction. **Abh.ii.28**—*guṇakārā bhāgahārā bhāgahārāste bhavanti guṇakārāḥ / yaḥ kṣepaḥ so'pacayo'pacayaḥ kṣepaśca viparīte* //(In the method of inversion, multipliers become divisors, and divisors become multipliers, additive becomes subtractive, and subtractive becomes additive; Eng tr by KSS). The book, however, has not collected any original verses, nor any example, when and how the word, 'guṇakāra' has been used as 'co-efficient'.

There are varieties of *Śabda-kośa* in Sanskrit and in regional Indian languages. A number of general Sanskrit to English dictionaries have also

been compiled by Macdonell, Monier Williams, Apte, and others. But they are mostly not subject specific, and in a way not of much help to scholars dealing with the specified scientific subjects. From this perspective, the volume on mathematics is quite unique in its contents and planning. A comparative analysis, as presented, will help scholars to appreciate the evolution of technical terms for its perspective significance.

However, the work has several lacunae. The historiography is mixed up with latest and original reference having no specific order; some meaning is explained, others are not, and exact references could have been used to identify the time when the scientific significance of the word was actually understood. In the fitness of things the secondary references with page numbers could have been used only for discussion. The abbreviations are cumbersome, some are with full stop, others are without, some technical terms during discussion are italicized, others are not, and so on. These could have been made uniform and simpler. Some simple mistakes are possible in this type of work for the first print, for instance, p.464, 5th line from the bottom, 'minus sign' to be replaced by 'equal sign'. I am sure these type of mistakes will be taken care of in the second edition.

The book is the first in the series, indeed a very good, efficient and bold production. The editor and the collaborators must be thanked for their exercises in skillful selection of technical terms with coverage. The researchers could venture to keep it even in their personal library because of its usefulness and low price. The work has a merit and is a must for libraries. The publisher should make all round effort for its easy availability through oriental publication selling-houses in major towns in India.

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Pramatha Nath Bose, *Reminiscences & Reflections of a Septuagenarian: from Amrita Bazar Patrika, 1931-1934*, compiled and edited by Subir Kumar Sen, Subir K. Sen Memorial Committee, 2013; 159 pages.(Available from Jnan Bichitra, 16 Dr. Kartik Bose Street, Kolkata – 700009)

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This is an autobiographical account of a pioneer scientist of India, Pramatha Nath Bose (1855-1934). Bose was the first native Indian graded Geologist at Geological Survey of India. Apart from his own education and service life, Bose touched upon several important issues in this recollection – India's past glory and present dismal condition about indigenous industries, how to improve that, importance of science and technical education for industrial rejuvenation, people's fad about western culture, untouchability, communal harmony etc. It shows Bose's multifaceted personality and his holistic approach to science and the development of the country as a whole.

The book starts with Bose's fond remembrance of his early child life in his ancestral village. This information is based on an article first published in the Puja special issue of *Amrita Bazar Patrika* in 1931 (p. 56). Here he touched on the simplicity of life at that time and communal harmony prevailed amongst the communities. Here and in several other later articles, he touched upon the problem of mosquito and the resultant malaria. He blamed the railway embankments for the stagnation of water for the spreading of malaria which was unheard of in his childhood.

From the first four chapters, we came to know about his student life, both in India and in England and finally coming back to India with a job at the Geological Survey of India (GSI) from England itself. And Bose mentioned, "This was the first case in which the Secretary of State exercised his discretion in favour of an Indian in regard to the appointments in his patronage". He went to England after qualifying the Gilchrist scholarship in 1874. He also delineated on Brahma Samaj and Keshab Chandra Sen (1838-1884). He clearly mentioned that he was impressed by Sen and became one of his ardent followers. Possibly by this influence, he developed an uninhibited attitude towards orthodox Hinduism and even tasted so-called *tabooed* foods of the Hindu society. In between, in Chapter two, he expressed his reservations about influencing school and college students in political movements.

Bose touched upon the issues of India's indigenous industries – its past and present condition, importance of science and technical education and his involvement in it, people's hankering for western style of life and the importance of simple Indian life etc in the next few chapters (five to fourteen; Chapter eight is not available). In between he also described his

life and experiences of working at GSI and his historic engagement with the Tatas by which they established their steel plant at present day Jamshedpur.

While mentioning India's past glory of indigenous industries and developments in technology, he also pointed the reasons behind its decimation as well. According to him, the reasons are: "dearth of capital"; failure of the Indians to keep pace with its requirements; delay in establishing new industries by which time foreigners either established that kind of industry or got hold of the market by importing such items from their countries; lack of practical training to establish big industries; lack of proper attitude required for establishing new and big industries etc. But Bose did not confine himself in just criticizing the situation. He tried to do something himself to improve the situation.

He understood the importance of science and technical education to improve this situation. Throughout his life, Bose was an ardent advocate of developing Indigenous industries. In 1884, he started a soap factory. This was the first soap factory in India. The factory could not be run successfully for various reasons. Bose organized an Industrial Conference in 1891. It is for the first time that such an event took place in Calcutta. In 1896, he tried to run a coalmine in Asansol. Under his leadership, the second Industrial Conference was held in December 1906.

In 1886 he published a pamphlet *Technical and Scientific Education in Bengal*. In 1887, Bose started to teach Geology at Indian Association for the Cultivation of Science (IACS). Mahendra Lal Sircar (1833-1904; a physician, social reformer and propagator of scientific ideas in nineteenth century India) established IACS in 1876. However, this course was discontinued soon due to lack of students. From 1901-1903, in addition to his normal official duty at the GSI, Bose taught Geology at the Presidency College. The National Education Council and Society for Advancement of Technical Education were established in 1906. One of the proponents of this idea was Sir Taraknath Palit (1831-1914; a lawyer and philanthropist; donated total life savings to the University of Calcutta for the advancement of science education). Bose was also enthusiastic of spreading technical education in Bengal. Palit asked Bose for his help.

He worked with Palit, Rashbehari Ghosh (1845-1921; lawyer, social worker and philanthropist; established an endowment for science education

at the University of Calcutta), Brajendra Nath Seal (1864-1938; noted philosopher and educationist), Jagadish Chandra Bose (1858-1937), Prafulla Chandra Ray (1861-1944) and others to establish Bengal Technical Institute (BTI). Finally, BTI started to impart technical education from 25th July 1906. P. N. Bose was an important member of the Executive Committee of this Institute. Primarily under his aegis as the Honorary Principal, BTI progressed a lot. Due to long absence from Calcutta for various reasons, Bose resigned from his post in 1908. However, as the Executive Committee was reluctant to deprive the Institute of his service, they appointed him as the Rector of the Institute.

In his first lecture as Rector (1909), Bose espoused the idea of the merger of National Education Council and Society for Advancement of Technical Education in Bengal. The merger happened on 25th May 1910. Bose became the Proctor of the merged Institute. Palit was against this merger. However, finally the merged Institute became more popular and developed into College of Engineering and Technology, Jadavpur in 1929 and finally transformed into today's Jadavpur University (24th December 1955).

He argued in favour of changing the habits of Indians from fondness and taste for foreign way of living and products to our own traditional way of life and using our natural products. According to him, this may be helpful for us as establishment of industries by Indians is not moving at a brisk pace. He called this "negative" method of living as "our economic salvation". He was also vocal about the good impact of our village self-governance in our country and criticized its destruction by the British rulers. Unequivocally he mentioned that our rural people may be illiterate but the way they manage their life in the most humble and simple way shows they are no fool or unwise persons. Rather, he said, it shows their genuine character and high values of their life.

He argued in favour of removal of caste system without "an attitude of hostility towards the caste system" which he claims is visible amongst the new proponents of social reforms. He is of the opinion that these people's way of looking at the caste system "might lead to class warfare and thus disturb social harmony". He added that the zealous proponents of western civilization with the doctrine of imposing equality amongst all accentuated

the problem of making each element antagonistic to each other. In this regard, he also mentioned his angst against “Lucknow pact” (1916), and Bengal pact (1923). He considered that these pacts acted against the spirit of Hindu-Muslim brotherhood.

In the next few articles, he bemoaned the degeneration of physical abilities of Indians. He blamed the spreading of western culture and ethos in our life as the reason behind this. He talked against the indiscriminate use of modern western medicines by Indians. While discussing these, he discussed the ravage of malaria in India and specially in Bengal and questioned the efficacy of quinine in treating malaria. He was against the health primers available in the market in those days and their prescriptions for keeping good health towards Indians. He was of the opinion that our age old practice to maintain health and hygiene is better for our common people. Rather he blamed the western way of life including changing food habits for the health-related problems. He also reminded the virtues of mental peace for keeping good health and cautioned against longing for more and more.

Bose discussed the problem of communalism, its cause and cure in next three articles. He called it the “greatest curse of present day India”. Calling it a recent phenomenon in India, in the first article of this set, he described the harmony that prevailed between Hindus and Muslims during all these years and even during Muslim rule in India. According to him, Lord Curzon (1859-1925) sowed the seed of it in 1905 with the partition of Bengal and with a pro-Mohamedan policy. It was nursed later on by the British by Morley Minto reform (1909) and accentuated by Montague-Chelmsford reform (1919). He questioned the roles of our leaders and thought that perhaps their activities heartened the British Government to act in this insidious manner. To cure it, he maintained, there is a need for balancing the materialistic ideals of western civilisation with the spiritualistic ideals of Indian civilisation.

In chapter fourteen Bose emphasized, “the evils the world is now suffering from are mainly due to the predominance of the modern culture of the west”. He commented “The great wars of the future will be fought not for interests in Europe, but for interests outside Europe”. He rued the fact that though natural science developed tremendously in the west but they used it “extensively” “to practical purpose for saving labour, for adding

comforts and luxuries, and for increasing the destructiveness of firearms”. Rather, he opined, if the western countries applied science “within the limits of intellectual culture, it would not only have done no harm, but would probably have done an immense amount of good”.

In the last article, he discussed about the earthquake which ravaged north Bihar on January 15, 1934. He stressed the importance of constructing earthquake resistant buildings by imparting training to the local engineers. For that, he suggested that the Japanese engineers may be requested as they already have that training. Bose was a trained geologist. However, interestingly, except the last article on earthquake he did not discuss almost anything in his prime area of expertise in these articles. Was there any reason behind this? Sankarsan Roy, former Director, Geological Survey of India, in a recent article [*Science and Culture*, 78.1-2 (2012) 37-39] indicated so.

Printed on good quality paper with decent cover image, this is an important contribution to the understanding of a pioneer scientist’s thoughts on a gamut of issues plaguing our country in an important junction of our nation’s history. The book has several appendices. These may help to understand Bose, the person and his works properly. For this, the editor must be commended. However, it is sad to note that there are several printing mistakes, problems with quotation marks etc. in this important book. The index also requires improvement. Personal names are indexed directly rather than using their surname first. It is hoped the Committee may take care of these errors in a future edition, if they publish one.

The editor commented (p. 16) “... Rabindranath, Dr. J. C. Bose or P. C. Ray or many other persons have not for once mentioned him even when the situation arose.” However, Ray quoted Bose from his book *Swaraj – Cultural and Political* on “indulgence in English luxuries” in his autobiography, *Life and Experiences of a Bengali Chemist* (volume 2; pp. 342-343; Asiatic Society edition). In chapter VII, Bose mentioned about the Advisory Board of Experts constituted for overseeing the activities of the Bengal Technical Institute. Bose himself was the Honorary Principal of this Institute. J. C. Bose, P. C. Ray and others were the members of this Board. From this, it may be easily inferred that Bose and the Board members used to meet regularly to decide the policies about how to run the Institute.

Therefore, P. N. Bose and Ray surely knew each other closely. Even then, it is interesting to note that while quoting P. N. Bose, Ray just called him “a Bengali writer”.

Bose was first to introduce the study of micro-section as an aid to petrological work in India (at Geological Survey of India), still he is an unsung hero in the annals of Indian history of science. This book may help to understand him and his versatile thoughts in a better manner. In keeping with the tradition of the eminent Bengali persons of nineteenth century, Bose did not just confine himself only in his small area of work. He developed an all round approach for the issues that confronted our country under British rule at that time. He was having his opinion on important issues like education and specially importance of science and technical education, social issues like communalism, untouchability etc. and expressed them clearly on the pages of these contributed articles. This book is a must read for those who are interested in the unfolding of the mind of a pioneer of modern Indian science and his thoughts on various socio-cultural issues confronted by our country during this period.

Acknowledgement is due to Prof. B.K. Sen, Formerly with University of Malaya, Malaysia and Dr. H.P. Sharma, Bengal Engineering and Science University, Shibpur 711103, India

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