Indian Journal of History of Science, 44.3 (2009) 453-462

History of Science Program of the Indian National Science Academy(1959-2009)*

Dr. A K Bag, Editor, *Indian Journal of History of Science* was invited to say a few words about History of Science program of the Academy in the Project Investigators Meet held at the Jadavpur University, Kolkata on 13-15th April, 2009, in view of his long association with the program almost from its inception. Prof. Pradip Narayan Ghosh (Vice-Chancellor of the Jadavpur University), Prof. Siddhartha Datta (Pro Vice-Chancellor), Dr. Subimal Sen (Chairman, West Bengal State Council of Higher Education), Prof. Shymal Chakraborty (Physical Chemistry, Kolkata University), Prof. Bikash Chandra Sinha (Director, Saha Institute of Nuclear Physics, Kolkata), Prof. R Gadagkar (Chairman of the Research Council of History of Science, INSA), a few fellows of Indian National Science Academy and other participants were also present.

To start with Dr. Bag, emphasized that this is not only the Platinum Jubilee year of the Indian National Science Academy, but also the Golden Jubilee year of History of Science Programme, since it was started in 1959 at the Asiatic Society (Kolkata) sponsored by the Academy. The way the Indian Science Congress Association (Kolkata) headed by Professor Meghnad Saha, took initiative for the establishment of National Institute of Sciences of India (alias Indian National Science Academy), in a similar fashion the Asiatic Society (Kolkata) was instrumental to initiate the History of Science Program through a Board headed by Dr. A.C. Ukil, Former Past President of the Academy, himself an eminent medical person, other members being Prof. D M Bose, Director of Bose Institute who was also the teacher of Prof. M N Saha & Prof. S N Bose. Profs. Priyada Ranjan Ray & S N Sen, well-known experts in different areas of History of Science, Prof. Chintaharan Chakravarty, the famous Sanskrit scholar, Prof. S K Saraswaty, the historian and the then Secretary of the Asiatic Society.

History of Science Board(1959-1965): At its initial phases in 1959, the Board used to meet once in a month at the Asiatic Society on a Saturday, and the discussion went on from 2 PM to about 8 PM. Lot of discussion used to take

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place at its initial phases as to the type of methodology to be followed for the new program and research relating to the studies of history of science. **In Indian context,** occasional references were made to P.C.Ray, B.K.Sarkar, B.N.Seal, G.N. Mukhopadhyaya, P. Neogy, B.B. Datta & A.N. Singh, P.C.Sengupta, M. N.Saha , G.P.Majumder, and others for their contributions in different field of early science. **In international context**, books of Bertrand Russel, J.D.Bernal, Charles Singer, C.H.Waddington , Sir Joseph Needham and others occasionally came up. The works of Russel, Bernal and Needham had Marxian approach, and considered Science, Technology and Society as *tri-murty* (three faces).Emphasis was given to the associated growth of science and technology and its relationship with the society and vice-versa. There was another thought that the science is unique, it has its own pattern, spirit and beauty, and it's progress of quantum jump in knowledge is associated with the contributions and boost by the great scientists like Copernicus, Galileo, Newton, Faraday, Madam Curie or Einstein who had been clinical , methodical and even emotionless in their approaches.

Methodology: As regards methodology, the Board discussed various features and accepted broadly the methodology of Needham, followed in his *Science and Civilization in China* , and suggested that

(i) India has a history of more than five thousand years, and in view of the fact that every age is different and has its own science, or in other words, the science carries the stamp of its age; it recommended that the studies and researches under this program may be pursued in three phases, e.g. Ancient Period (from Antiquity to 1200 AD), Medieval Period (1201- 1800 AD), and Modern Period (1801- present times).

(ii) The supervisors and fellows associated to each Period should first make a survey and compile the primary and secondary sources of their respective fields in the period for translation and studies. It was felt that there was a need to organize Symposiums/ Conferences systematically to take a stock of the situation/ improvement from time to time. A Symposium on History of Sciences of India was organized by the Board at the Bose Institute(1961) and its proceedings are published in *Bulletin of the National Institute*(1962).

(iii) Research Fellows, apart from their duties of collation of data from important primary sources with English translation, were assigned a topic from time to time and asked to deliver a talk before the Board . A few monographs based on primary sources were compiled in the process. These are: *Scientific*

synopsis of Caraka & Suśruta Saṃhitā, *Śulba-sūtras* (Eng tr & notes), *Ancient Glass* and *India* , *Some Aspects of Pre-historic Technology*, *Bibliography of Sanskrit Sources in Astronomy and Mathematics* and were made ready with in 5 years time.

(iv) Towards the end of 1964, the Board also suggested that an effort might be made for publication of an '*Indian Journal of History of Science*'. The work of the Board expanded to a great extent; and it recommended that the responsibility of the Board should be taken over by an All- India Commission, and has to be managed directly by the Academy.

National Commission for History of Science

The Academy accepted the suggestion of the Board for a Commission and sent a delegation with Dr Homi J. Bhava as leader to meet Prof.Humayun Kavir, the then Minister for Science and Technology , and Mr M.C.Chagla, the then Central Education Minister for necessary support and grant for the purpose. The proposal was immediately approved, and a 'National Commission for Compilation of History of Sciences in India' was formed in 1965 consisting of 21 members with Academy President as Chairman, one senior FNA as Vice-Chairman in charge of history of science & specialists from other branches of science, indology, archaeology etc, besides three other period committees for Ancient,Medieval & Modern phases and an editorial board for *Indian Journal of History of Science* (IJHS) to assist the Commission's activities. In 1989, after 25 years of its activities, the name of the Commission was changed to 'Indian National Commission for History of Science' to enlarge its scope to international activities .The suggestion was of course unanimously approved before by a 'Workshop in History of Science', which was accepted by the Academy. In addition to other objectives already underlined , interpretation, critical evaluation of facts, organization of national and international conference and publication of important materials were also emphasized .The activities of the Commission can be broadly divided into two major phases: from 1965 to 2003, and 2003 to present times, and it would be interesting if these are discussed seperately.

Period (1965-2003): The National Commission, to start its work, accepted all most all the recommendations of the History of Science Board at the Asiatic Society, Kolkata and made a considerable progress in the areas of Projects/ Publications and running of *IJHS* in its 39-40 years period , which may be underlined as follows :

Research projects/ Publications: All the projects made ready by the Board were taken up for printing systematically by the Commission. A large number of projects relating to Ancient, Medieval and Modern periods were accomplished during the period from1965 to 2003 . To give examples, for **Ancient period**, projects like *Āryabhaṭīya* with commentaries (four vols), *Śiṣyadhivṛddhida-tantra* of Lalla (two vols), *Vedāṅga Jyotiṣa* of Lagadha, *Vaṭeśvara-siddhānta* (two vols), *Laghumānasa*, *Rasārṇavakalpa* & *Rasaratna-samuccaya* of Śri Vāgbhaṭa , Vṛkṣāyurveda, (Critical ed & Eng tr), Dye and Dye Plants in India (based on Sanskrit sources) , Weather Science in India, *History of Astronomy in India*, *History of Technology in India* (Antiquity to 1200)were accomplished and so on. For **Medieval period**, projects cover *Jahaṇgīr- the naturalists*, *Fatullāh Shirāzī* (a 16th century Indian scientist), *Khulāsatul Hiṣab* of Baha-ud-din Amuli, *Zij-I Mohammad-shāhī*, *Tantrasaṃgraha*, *Sadratnamālā*, *Yuktibhāṣā* (Eng trs with notes), Colouring agents and their application in dyeing, printing and painting, Handicrafts of Kashmir Papier Mache, Medieval Mining& Metallurgical techniques with respect to Garwal region, Astronomical Instruments of Jai Singh and Central Asian School of Astronomy, Textile Crafts, Unani Medicine in India—Hakims & Hospitals, *Ghāni*, Indian Food, Minerals and Metals in Pre-modern India and so on. For **Modern period**, projects are: *A Concise History of Sciences in India*, *Scientific and Technical Education in India*:1781-1900, *A Survey of Bengali Writings*:1800-1950, Development of Physics, Astrophysics, Astronomy and Geophysics (1850-1950)-A bibliographical study , History of Magnetic Studies in India(1850-1980)—A bibliographical studies, Hundred Years of Botany in India, *History of Technology in India*: 1801-1947, History of Nutrition Research in India and the role of National Institute of Nutrition, Calendar Reforms in India, etc. The projects with Roman character are published by INSA, others by private publishers and in *IJHS*.

The projects like, Indian Food by K.T. Accaya , Hundred Years of Botany by B.M.Johri and others were published by private publishers like Oxford and IBH Press, Delhi , which fetched huge earings towards royalty on 5% basis. This practice has however been stopped.

About 350 projects were approved during this period by the Academy, Ancient Period-150 , Medieval Period-100, and Modern Period-100 during this period of 39 years. Of the projects approved, about 30% were accomplished.

Seminars/ symposium: About 20 national and international seminars were organized during the period , almost one in two years on an average. A few are: Symposium on History of Sciences in Ancient and Medieval India (1968), Copernicus and Astronomy (1973),Al-Bīrūnī (1975), Āryabhaṭa(1976), Science and its Impact on the Society (1978), Seminar on History of Medicine in India(1979),Seminar on Science and Technology in India during 1400 to 1800 AD (1980), Millenary Birth Anniversary of Ibn Sina—India and Central Asia(1981), *Scientific and Technological Exchanges between India and Soviet Central Asia in Medieval Period,* Medicine in Medieval India (1981),Science and Technology in India during 18-19 th centuries(1982), India-Soviet bilateral seminar on India and Central Asia (1985), Ibn-Sina- International Seminar (1986), Seminar on Calcutta and Science(1989), History of Oriental Astronomy-International Seminar (1989), Seminar on Science , Technology and Social Change during 1900-1980 (1992), Indo- Portuguese - International Seminar (1998),*The Concept of Śūnya* (2003), were organized. All the seminar proceedings are published either in *IJHS* or in the form of a book by INSA or in collaboration with other organizations.

Period (2003- onwards): In the management of projects and organization of seminars, a number of changes came up from 2003 onwards . The three advisory committees for Ancient, Medieval and Modern periods were amalgamated to a Research Council to oversee the overall progress of research projects.

A mechanism— 'Annual Investigators' Meet, became operative, where the project investigators/Research Fellows of new and on-going projects were given an opportunity to defend their own project. This has become the major annual event . The venues of the Meet are also being shifted to make the program popular in the universities and other centers. The organization of national and international seminars have however stopped. A few important works, *Grahalāghava* of Gaṇeśa, *Karaṇakutūhala* of Bhāskara II (Eng tr), *Growth of Scientific Periodicals in India* :1901-1947, and *History of Technology in India* (Medieval Period), and so on were completed during this period and published by INSA.

IJHS: Considerable progress has also been achieved in *Indian Journal of History of Science*(*IJHS*), which started printing from 1966 onwards as recommended by the Board/Commission. From 1966 to 1983 (18 years) it was bi-annual, became quarterly from 1984 onwards. The 44th volume is being printed

this year without any interruption. It started with 7 to 8 research articles annually at the initial stage, slowly adding proceedings of the national seminars, supplements containing important source materials , thematic issues, historical notes, book reviews, obituaries with complete list of publications. The number of entries has now increased to 40 annually on an average. About 1000 entries are published so far.

During the last few years, thematic issues on, 'Cannons, Gunpowder, Artillery and Military Modernisation in the Medieval Period' (2 issues, 2005); 'History and Characteristics of Wootz Steel in India and Abroad' (2 issues, 2007) have become extremely popular in which a large number of Indian and foreign experts have contributed. Another thematic issue on 'History of Medicine in India' is also published in June issue of *IJHS* (2009). The *IJHS* has slowly acquired international standing and great reputation and many foreign and national experts have started contributing to it on a regular basis. The Editorial Board is also being slowly expanded with foreign experts.

Concluding Remarks: In conclusion, it will not be out of place to point out some of the problems in achieving our goal , gaps and suggestions to overcome the problems in the program of history of science:

Goal : As regards goal of history of science program, Prof. D.M.Bose, one of the Founder Co-Chairman of the Board as well as the Commission for History of Science in India set the goal of the program, and he noted,

> "While special importance was given to the writings of history of sciences in India, it was also recognized that history of science should be the subject of continuous study which the Indian universities should be invited to take up later.....By such means a cadre of science historians would be trained from which the universities may be able to recruit staffs for their history of science departments'[*IJHS*, 1.1(1966) Preface].

Prof Bose coined two words, ' science-historians' and 'historians of science', the former to be trained in historical processes and technicalities of science, and the latter in the general nature and growth of science, so that both could appreciate and weave different phases and growth of science and their impact of science, specially relating to ancient and medieval periods. As regards modern period science in India, there are distinct phases like 'Science of the British Rāj (Colonial science) & its Impact', 'Nationalism & Science, National Institutes including Govt. Policy on Science & Technology' , and 'Contributions

made by the Indians to the World Science'. He felt that the 'historians of science' will not have much difficulty in the assessing and appreciating the first two phases, but the science- historians have the natural advantage in the third phase, dealing with ' Contributions of Indian scientists to World science'. The third phase is really critical in history of science, for world knowledge in science towards the end of the 20th century has grown exponentially, more than the number of population in every 10 years. The classical knowledge has given rise to atomic and sub-atomic phases which has revolutionized not only our knowledge system in all spheres of science and technology , but by its impact on the society, and our perspectives in science has altogether changed. What Prof Bose repeatedly argued that in this program, the 'science- historians' , or 'historians of science' have their respective advantages and disadvantages , but what we want through these trainings is a bunch of dedicated well-versed speakers/ scholars who could talk and write about science with confidence and assess India's contributions to world science through its various phases of development. In a way, these two divisions are complementary to each other. It is still a distant dream! But we have to strive very hard to achieve this goal.

Gaps and Suggestions: There remain still a varieties of gaps in our studies. I am sure you will agree with me that it is very difficult to maintain the quality of research program in history of science.

The studies made during the early part of the 20th century, hardly 15 to 20 important manuscripts, some archaeological reports, basic inscriptions and dynastic records, travelogues formed the basic materials for their write up. Our systematic efforts in history of science have helped to find about 35-40 source-documents/manuscripts in each major disciplines of science, where as at least 100 basic important manuscripts/ sources are still lying untouched in the oriental libraries, while the numbers are much more. Other types of source materials lying untapped are still to be explored, and authentic unbiased text books are still to be written in each discipline of science in India both from its national and international perspectives. To accomplish such a job successfully, may be, we will be needing a number of leaders in India like Neugebauer, Needham, David Pingree, or even Ray to augment the activities in the program for 'Science and Civilization in India'.

This is all the more difficult , since the experts so far trained in different fields of history of science are quickly vanishing from the field. We have lost great

scholars like A.C.Ukil (Medicine), D.M.Bose (Science & Culture), Priyada Ranjan Ray (Chemistry), S.N.Sen (science-historian), Kuppanna Sastry, Bina Chatterjee, Kripa Shankar Shukla, KV Sarma, T.A.Saraswaty (Mathematics & Astronomy), , P.V.Sharma (Medicine), D.P.Chattopadhyaya (Science & Society) etc.

I personally feel that the role of the universities/ IITs are important . Prof Bose referred to the universities which could be the places of continuous study. I also do believe that Universities/ IITs can develop centers which could offer quality training, since the expertise in all fields of science, technology, history, philosophy & culture is available in one campus. What is needed is leadership, facility and enough zeal and motivation to fulfill the goal , as envisaged by Prof Bose . It is a matter of some satisfaction that the Academy has succeeded to some extent to inculcate some amount of interest in a few individuals, as a result a few Centres/ Universities/ IIT's have been coming up with teaching program in a small measure . The Indian National Science Academy, Delhi, on its part, has done a marvelous job in the field of history of sciences in India for the last 50 years, not only by authentic publication and disseminating knowledge in the field, but by playing the role of a catalyst, establishing science as a part of our heritage and in augmenting the activities of the program by all round support.

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